TECHNOLOGY

TECHNOLOGY DEPT.

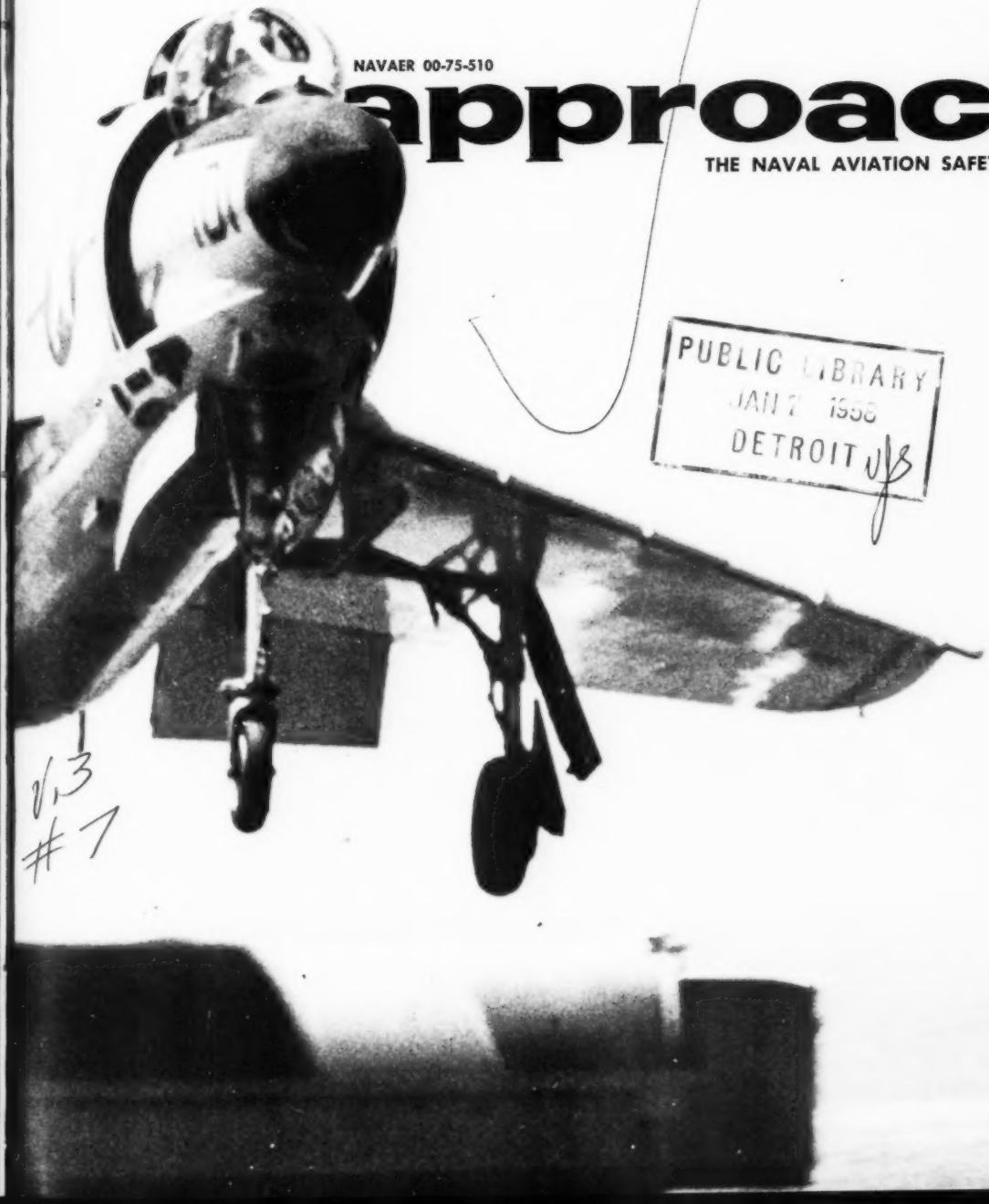
January 1958

NAVAER 00-75-510

approach

THE NAVAL AVIATION SAFETY REVIEW

PUBLIC LIBRARY
JAN 7 1958
DETROIT



IN THIS ISSUE

1	Letters
4	High Q Chuting
11	Monitor
12	Truth & Consequences
18	Anymouse & His Hairy Tales
22	They Went That Away
24	Your Personal Equipment (Headmouse)
27	Cold Weather Commandments
28	Notes from Your Flight Surgeon
30	A Question of Attitude
32	Whiz Quiz
34	Cockpit Air Contamination
37	That Elusive Cotter Pin
38	From the Ground Up
41	Murphy's Law
42	Once Upon a Time
43	Wheels-Up Landing Saves

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.

PHOTO CREDITS: COVER, COURTESY VF-14
PAGE 4, MR. ORMOND GIGLI, NEW YORK, N.Y.

approach

This periodical contains the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders or directives unless so stated. Material extracted from Aircraft Accident Reports, (OpNav 3750-1), Aircraft FLIGA Report (3750-10), and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, UCMJ. Names used in accident stories are fictitious unless stated otherwise. Photo credit: Official Navy or as credited. Articles may be reprinted with prior permission.

Contributions are welcome as are comments and criticisms. Address correspondence to Director, U. S. Naval Aviation Safety Center, NAS Norfolk 11, Va.

Printing of this publication approved by the Director of the Bureau of the Budget, 9 Dec. 1954.

Published monthly, this magazine may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Single copy 30 cents; 1 year subscription $2.50; 75 cents additional for foreign mailing.

Library of Congress Catalog No. 57-60020.

Published by U.S. Naval Aviation Safety Center
NAS Norfolk 11, Va.
Phone Norfolk, MAdison 2-8211, extension 4331
Director—RADM Allen Smith, Jr.
Head, Literature Department—CDR F. C. Moyers
Editor, A. B. Young, Jr., **Managing Editor,** LCDR W. J. Thomas
Art Director, R. A. Genders
Associate Editors: CDR J. A. Scholes; J. T. LeBarron, JOC; J. C. Kiriluk
Illustrators: LT N. B. Jackson; LT E. T. Wilbur; R. J. Berg, DM3; R. B. Trotter

Vol. 3 **No. 7**

January 1958

LETTERS

GOTTA READ, MAN!

Sir:

The article "We Gotta Go, Man!" on pages 34-39 of the October APPROACH should be read by *all* personnel of *all* squadrons. Any squadron—such as VMAT-20—that can chalk up 24,000 flight hours in AD's with no airborne engine failures rates a salute for its efficiency and a close scrutiny of its practices and procedures so that other squadrons may "go thou and do likewise."

The foregoing record is all the more outstanding when we recognize that it was accomplished during a period in which there existed an upward trend in the engine failure percentage of material-caused accidents involving the AD with the R-3350 engine.

Careful reading of the entire article and conscientious application of the prescribed operating procedures, or similar procedures as applicable to squadrons operating other model aircraft, can only lead to greater safety of operations, lowered accident rates and increased unit readiness.

—E. L. FARRINGTON, Captain
Aviation Safety Division,
DCNO (Air)

COLD FACTS HERE

Sir:

. . . In your "Tip Tank" column, October issue, I noted where you referenced the carbon dioxide tests being run as a result of a dry ice incident at McGuire AFB. These studies have been completed and the results disseminated to the field.

I've acquired an extra copy of this report which I am forwarding to you in the event you hadn't been cut in on the results. Some of this info may be of help to the Navy transport troops . . .

KENNETH T. McKIM, Captain,
USAF, Chief of Safety, 1607th
Air Transport Wing,
Dover AFB, Del.

May your beer and your cabins always be properly chilled, Captain. Thanks to your thoughtfulness, our transport troops now have a copy (via Dec "Crossfeed"). Others wanting the cold facts, please write APPROACH *— Ed.*

CYCLE

Sir:

Citing a recent incident at our station, the pilot of a TV-2 elected to land on two wheels when his port main refused to come down. His fuel state was *low* and time did not permit maintenance personnel to be called to the tower.

The pilot actuated the emergency hydraulic pump. However, he failed to move the emergency hydraulic system selector lever into the EMERGENCY position. After the accident, the gear was cycled on jacks and it was found the port main would have come down if correct emergency procedures had been followed.

My point—Had the tower asked "have you cycled your gear in emergency position?", an accident may have been avoided.

This procedure, I believe, would apply to all aircraft with retractable landing gear. It is not standard operating procedure, due to the fact it is considered by some to be insulting to the pilot's intelligence. But, is it any more or less insulting than the standard "check-gear-down-and-locked"? . . .

SALLY J. SMITH, AC1
NAS North Island

WHY UP?

Sir:

Have just read your excellent article on the wheels-up landing accident situation ["Design for Damage" Oct 1957] and a couple of thoughts occur to me. These seem to me to be readily proven and have been used in operations by several squadrons over a period of years.

One—The data indicate that the touch-and-go landing is a hazardous maneuver because of the repeated cycling of the gear. Why the blazes do we raise the gear at all? We have aircraft (AD) where a danger of torque-rolling upon application of full power exists and others (all of the jets) where the trick is to stay below the wheel limit speed to avoid bending doors and panels. With this much power available what is it that we are conserving by raising the wheels?

Two—Leaving the wheels down when going around for another touch-and-go identifies you and helps all of your friends plan their own approaches.

Three—In the interest of simplicity it even turns out that the occasional GCA waveoff in weather is simplified if you agree that the airplane can just plain tow the wheels around until I get this thing on the ground. This decision simplifies a critical area of flight and eliminates one more trim change, self-inflicted, on instruments at low altitude.

It appears to me that, with the power we have in all of our current aircraft, raising the wheels each time on the touch-and-go landing needlessly complicates the problem. The airplanes are complicated enough as they are. Anything that the pilot can do or decide, in advance, to make his problem simpler is worth doing.

R. F. (*Greymouse*) HUNT, CDR

SHOCK TREATMENT

Sir:

. . . Another item came up at a local aviation safety council meeting during a discussion of wheels-down-checks which are sometimes given by a pilot turning onto the base leg with his gear up.

It was concluded that such reports sometimes become automatic because they are repeated so many

CONTINUED FROM PRECEDING PAGE

times. It was also concluded that on many occasions the stock request by the tower for a recheck has become so repetitious as to be of no value.

It has therefore become standard practices at NAS Iwakuni to vary the phraseology of the tower's request for a recheck of landing gear. It is believed that a departure from repetition may occasionally shock a weary pilot into actually looking for his landing gear.

J. H. DOUTHIT
Operations Officer

Repetition of standard phrases has been known to get pilots into trouble—so variation may be okay. But confusion must be avoided, and so must the point at which tower operators become hard pressed for originality at the end of the day —Ed.

NEEDLE NOSE

Sir:

I was very much interested in the answer to question four of your "Distress Quiz" [September]. Conventional aircraft turning rate for standard rate turns is three degrees per second . . . Jets, I understand, have a four-minute needle (360-degree standard rate turn, 1½ degrees per second); conventional aircraft a two-minute needle (360 degrees standard rate turn at 3 degrees per second).

Conclusion: Since a standard rate turn in jets is at the rate of 1½ degrees per second, and if the needle is calibrated correctly, a full needle width deflection will show. However, your answer to question 4 (on page 40 stated ½ needle width at 1½ degrees per second for jets . . .

SAINT LOUIS NEEDLER

We musta been sleepin' under the hood again. The question four answer should have read "120-degree turns at 1½ degrees per second, as it does in the current SFID. Our material was originally prepared in 1956 when the SFID use the term "½ needle width." —Ed.

PLUMBER

Sir:

The enclosed award is designed and promulgated with the thought in mind that a little good-natured buffoonery sometimes accomplishes the purpose of keeping a sharp out-

THIS TOOL IS AWARDED IN JEST
IT'S DECIDED THAT YOU ARE THE BEST
WHEN WE FIND A PLUMBER
WHO PROVES HE IS DUMBER
THEN YOU LOSE THE RIGHT
TO THIS CREST

fit on its toes, safetywise as well as professionally.

With that goal in view it is suggested that the ground rules for issuance of this particular bit of nonsense be set along the following lines:

- This plaque must be displayed by the current holder in his stateroom if deployed or when shore-based, in his office.
- The award is to be of the rotating type, with the exception that anyone gaining possession for the third time will be allowed permanent custody and a duplicate or similar award will be struck.
- All decisions on issuance be conferred on the flight safety board with the commanding officer acting in place of any member who might himself be under consideration for this dubitable honor.
- All records of issuance are to be part of the files of the flight safety board.

W. L. DRAKE
Flight Officer HS-4

GOING HUP

Sir: I would like to add to CDR Harman's list (Sep 1957 APPROACH) of multiple rescues in the HUP.

My crewman and I made a three-man rescue while aboard the USS WRIGHT during May 1953, flying a HUP-1. It involved hoisting three men from the water who were occupants of a Guppy AF that had taken a late waveoff.

C. D. SHUMAN
LCDR USNR

AAR COVERAGE

Sir:

Your coverage of FLIGA reports is excellent and serves as a good warning to others of accidents that can and have happened. It helps us to learn of the accidents of others. and as some old bard said "Learn from the mistakes of others for you won't live long enough to make them all yourself." Now we have both the "FLIGA Digest" and the FLIGA 13 and 14 sections in the APPROACH. I for one say thank you for them.

Looking over those publications though has made me wonder why the same thing is not done with *some pertinent* AARs. A treatment of the AAR sections VIII and IX similar to FLIGA sections 13 and 14 appears, on the surface, to be most desirable. If necessary, certain portions could be changed or omitted to preclude the possibility of legal action. My thinking is that the reasons for and against printing such information would be the same for AARs as for FLIGAs and since one is printed why not the other?

FLIGHT SAFETY OFFICER
FAWTULant Det "B"

Due to a shortage of personnel and funds the quarterly FLIGA DIGEST has been discontinued. Much of this material will be published in other forms, and particularly as you notice in APPROACH. *However,* APPROACH *will*

not use the abbreviated 13/14 format for the time being because of complaints about the small type and lack of interest. As for AARs, several are used in each month as source material for "Truth and Consequences." Naturally, AARs, FLIGAs, and Anymouse reports inspire most of our educational and prevention articles, long or short. AARs and endorsements are culled for significant items by specialists in flight ops, maintenance and aeromedicine and equipment. Because of the publication of briefs in the "Weekly Summary of Major Aircraft Accidents" and the listings supplied safety officers via "CROSSFEED," a further routine APPROACH *listing might be rather expensive duplication. Suffice it to say that we try to never overlook an opportunity to discuss or re-emphasize any type of accident.*

If anyone has a suggestion for a safety area we've neglected, please holler—Ed.

PAPERS OFFERED

Sir:

. . . I noticed that it had been suggested that APPROACH [October 1957] discuss the physiological and aerodynamic problems associated with high-altitude highspeed ejection. It was stated that as more material on the subject becomes available, it would be published.

At the 1956 meeting in Chicago of the Aero Medical Association . . . a paper was presented on this subject by Mr. Richard Frost, our Vice President. The papers are published in Volume 28, the issue for February 1957, of "The Journal of Aviation Medicine."

. . . Mr. Frost has delivered several papers and written several articles on the subject of escape from high-performance aircraft. We would be glad to be of any service to you in this matter if you would so desire.

J. L. DENMAN
Stanley Aviation Corp.
Denver, Colo.

Thank you sir. We're taking steps to procure Mr. Frost's papers, meanwhile, see "High q Chuting" this issue.—Ed.

RE: "CRUTCH"

Sir:

I hope you get a blizzard of letters setting you straight on the reason the AD-6 divebrakes were rewired to prevent extension unless nose-down trim is 1½ degrees or more. I refer to your comment on page 30 ["Crutch"] of the Oct '57 APPROACH. If you don't get plenty of squawks about your wrong guess, it will mean that there is widespread ignorance or lethargy among AD pilots about one of the two things about the AD that have long been known to be lethal, if not understood. . . .

. . . Though *forward* trim or *closing* the divebrakes may get an AD out of a "tuckunder," the best answer is never to get into it. I am sure that BuAer had this in mind when they issued the service change.

And you, Headmouse, should be ashamed of having published guesswork rather than dependable facts.

Very truly yours,
P. M. PAUL
CDR Staff, CNATra.

Sir:

I just read a hairy tale in your October issue of APPROACH that need not have happened had the pilot known his airplane, and I doubt that it would have been published had any of your editors known the airplane. I refer to "Crutch" on page 30. . . .

C. C. LIVINGSTON,
Test Pilot & Flight Safety
Engineer, Douglas Aircraft Co.

Sir:

Attached is a memorandum from Mr. W. L. Whittier, Chief Service Engineer, which should clarify the situation posed by the Anymouse Report entitled "Crutch" in the October issue of APPROACH.

FRED R. BEAM
Field Service Representative
Douglas Aircraft Co.

. . . The primary purpose of the dive-brake on the AD is to establish a stable platform from which to project ordnance during a dive. Changes necessary to improve the primary purpose must be made even at the expense of compromising the secondary purpose, i. e., speed control during approach or let-down. If all dive-brakes are open and the stabilizer is set in the 1° nose-down to 6° nose-up range, it is possible to stall out the elevator during a dive or pull-out.

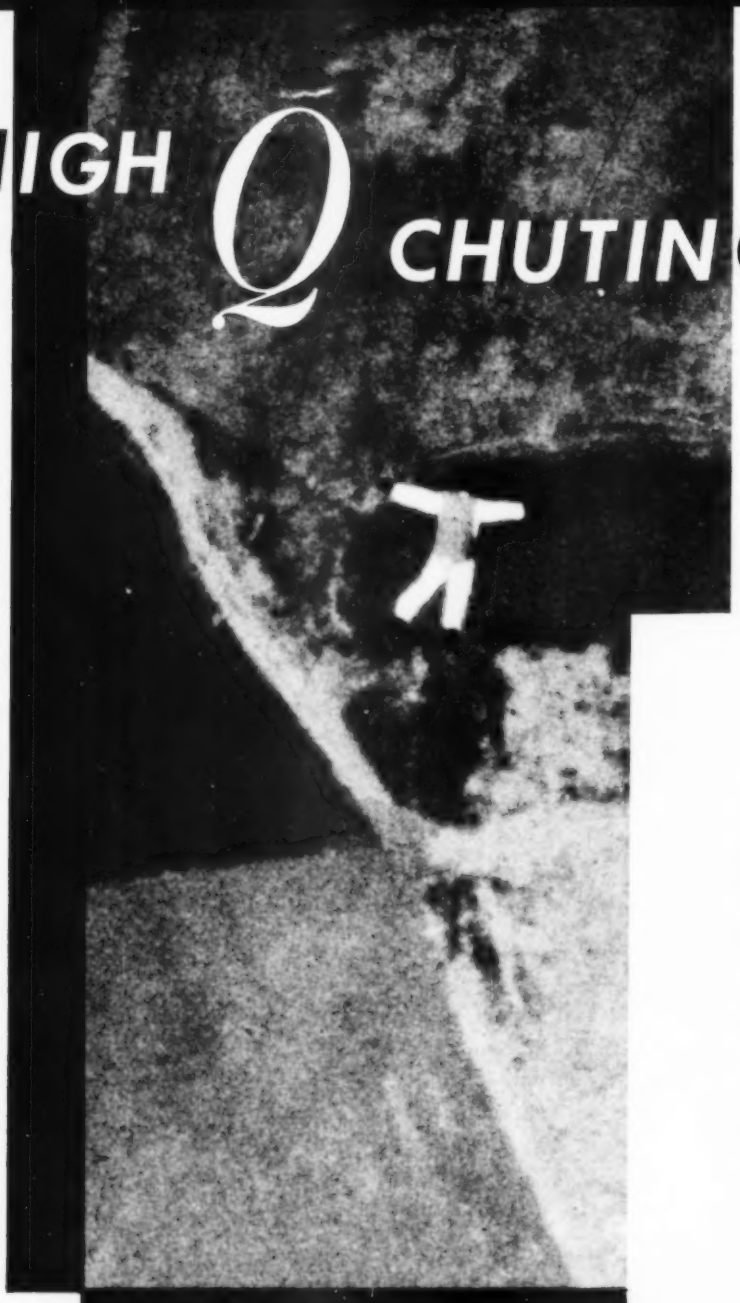
This stallout results in the control stick being violently jerked from the pilot's hand forward to full nose-down control and results in so-called "tuck under" which is in essence an outside loop. Even if the airplane structure were capable of withstanding this maneuver, oil starvation would cause loss of engine to say nothing of the improbability of completing the loop without contacting the ground. The combination of stabilizer position and dive-brake open mentioned above has been attained by opening dive-brakes immediately upon termination of a climb without resetting the stabilizer and also by the strictly taboo practice of using stabilizer trim change to assist in pullout. When "tuck under" does occur, the recovery technique is completely contrary to natural pilot reactions. It consists of increasing nose-down trim or closing the dive-brakes.

The pilot in the article spoke of the dive-brake as being a crutch used to correct a pilot error during landing approach. Actually, the trim switch tie-in is the crutch to preclude the pilot setting up a hazardous combination of stabilizer trim and dive-brake position. This tie-in also has a secondary value which precludes landing with dive-brakes extended.

In summary, a device which helps prevent a pilot error that may cost his life and another error which may damage his dive-brakes far outweighs the inconvenience of taking a wave-off during a fast approach.

Headmouse and Alpha Delta Pilot Anymouse erred. The letters of CDR Paul, and Messrs. Livingston and Beam set us straight. May that "blizzard" abate.—Ed.

HIGH Q CHUTING



"Curtain Call," May 1957 APPROACH, explained the doctrine of OpNav Instruction 3750.12 and gave a roundup of ejection facts and figures. As stated in that article, the *third* major cause of ejection injuries has been the opening shock of the parachute—19 percent of all injuries. This article will center around the known facts of high-speed, high-altitude parachuting.

F

30

MI

MPH

5

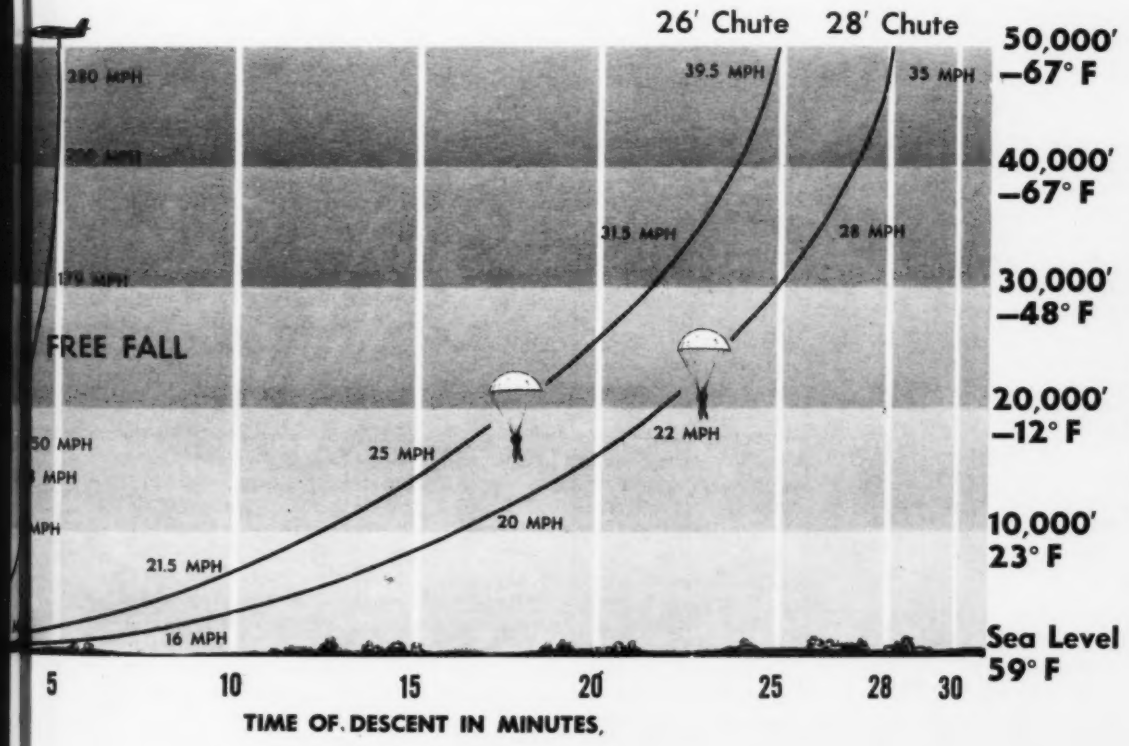
THE ORIGINAL concept of human being parachuting is generally credited to Leonardo da Vinci in the 15th century. He designed—but didn't produce—a leather canopy to permit gentle descent to the earth—but in the 15th Century, the market for such a contrivance was somewhat limited. Previously, only certain types of Araneida (spiders), endowed by nature with the art of free descent, had tried parachuting.

Three hundred years after da Vinci, in 1783 M. Sebastien Lenormand jumped off a building using what is believed to be the first parachute ever successfully invented; in 1797, Jacques Garnerin made a successful descent from a balloon. It was this early tribe of balloonists who finally got high enough above the ground to require some emergency means of getting down when their balloons blew up.

World War II really made the parachute standard equipment in military aircraft—but this history is well known. Recall, however, that World War II was fought sub-sonic!

Fleet aircraft of today have speed and high altitude performance rating which *exceed both* the pilot's physical capability of ejecting and surviving, and the parachute's design limitations should improper techniques be employed.

Yet with the newer high performance aircraft has come an increase in the ejection rates and escape attempts—and an increase in fatalities or injuries caused by poor parachuting technique. When a crisis occurs at high speed and high altitude, panicky pilots too frequently actuate their parachutes at a speed in



CONTINUED FROM PRECEDING PAGE

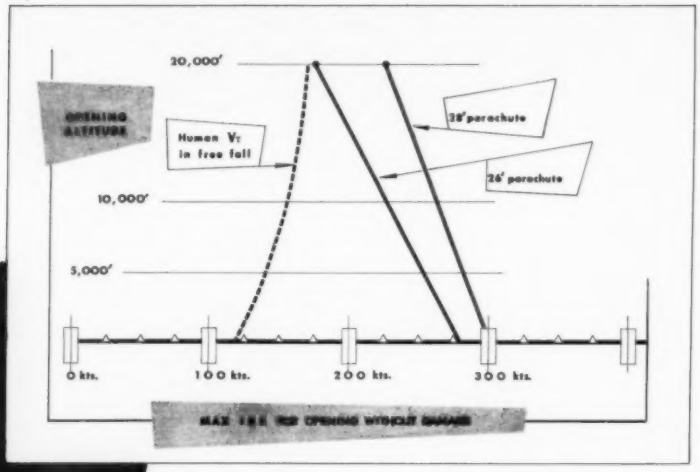


Fig. 1

excess of the design specifications.

Two sizes of chutes are in general use in the Navy; the 26-foot conical canopy developed as a result of the requirement for a low bulk chute, and the 28-foot flat canopy. The listing on page 10 identifies the parachute assemblies in which these canopies are packed.

Neither of these canopies was designed to be opened at extremely fast speeds or unusually high altitudes.

The Navy Parachute Unit at El Centro has conducted a large number of tests at all altitudes on both parachutes. Figure 1 shows the data compiled as the maximum opening speeds, up to 20,000 feet altitude, which the canopies can normally withstand without extensive or fatal damage.

Also shown is the terminal velocity of a 240-pound person in free fall—well within the limitations of the canopy.

Before leaving this figure, ponder the reason for not showing altitudes above 20,000 feet . . . *there is no conceivable reason for ever opening a parachute at a higher altitude.* (The only justification for opening one at 20,000 feet is that the jump was made over terrain that's 3 miles high.)

Why not open at high altitudes (or low altitudes with high speeds)? One reason is: too high a q.

WHAT IS q?

q is dynamic pressure, sometimes called velocity pressure or impact pressure.*

When the q is high, so are the shock stresses on an opening parachute. And the most influential factor on q is naturally the velocity squared—yet this quantity is controllable to some extent by the pilot and is planned for in automatic opening equipment.

q remains approximately constant at the same IAS at all altitudes—but increases rapidly with higher indicated airspeeds.

The picture is now beginning to shape up: ejecting at indicated airspeeds in excess of the free fall terminal velocity of the body requires a definite period of delay *to slow the pilot down to terminal velocity* before the chute can be safely deployed. This time is longer at higher altitudes than in the denser atmosphere near sea level. This is shown in Figure 3.

To develop more of the picture, we need to know some of the other factors involved.

OPENING SHOCK FORCE AND SNATCH FORCE—When the canopy is deployed, two forces occur in very rapid sequence.

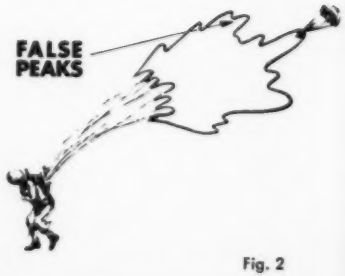


Fig. 2

* In aeronautical computations, many of the formulae contain the expression: "½ σ V^2." For example, in the Lift formula, $L = C_L \frac{1}{2} \sigma V^2 S$, and abbreviation, has been substituted by the engineers to stand for "½ σ V^2" where rho (σ) is the mass density of the air, and V the velocity is in feet/second.

The first is the snatch or line stretch force which results from the mass of the canopy reaching the end of the suspension lines. This is followed instantaneously by the opening shock as a result of the canopy inflating. The jumper will feel only one shock from these two forces, but at high q, this shock can be tremendous.

PERMEABILITY — This is a characteristic of the weave of the parachute fabric. It refers to the number of cubic feet of air per square yard which will pass through a piece of cloth in a given period of time and at a known pressure. Permeability varies with the pressure differential on opposite sides of the parachute fabric, and therefore is an important factor both during canopy inflation and during steady descent. For a given design of canopy, use of material with low air permeability will give a comparatively slow rate of descent, but will also inflate very rapidly and thus generate high opening forces. Use of material with a high air permeability will produce lower opening forces, but will result in faster rate of descent and, if the permeability is too high, the parachute may not inflate.

CUSHIONING — Air inflates the canopy as it blossoms. There is, also, a cushion of air *behind* the canopy in proportion to the mass density of the air—this cushioning is greatest at or near sea level and reduces the opening shock on the chute and jumper.

At high altitude feet, air fills the canopy as at sea level, pushes it out to full deployment, but the thinner atmosphere practically eliminates the cushioning effect behind the canopy, and it opens more quickly with greater shock action. Consequently, a parachute can be damaged at much lower speed and the g forces on the jumper are much greater. The conditions that produce an opening shock of 8½ g at 10,000 feet would develop 32 g at 40,000 feet.

PACKING OF CHUTE—To achieve low bulk in the packing of the chute, the canopy is folded in layers and the lines are carefully faked down and stowed in their proper loops. The packing sequence is such that during opening, the pilot chute comes out first to act as an "air anchor" and drag out the main canopy. The apex of the main canopy is extracted first, followed by the skirt, and finally the suspension lines. This sequence of deployment yields the best overall performance that has yet been achieved with a free-jump chute that meets military requirements.

The parachute often comes out in a blob as shown in Figure 2.

As the canopy begins to inflate, many "false peaks" occur in the canopy folds, where high dynamic pressures cause ruptures and failures of panels or whole gores. Moderate damage of this type will not greatly effect the parachute performance.

For easy opening and minimum stresses, it would be desirable to control the deployment; but for safety at low altitude, this is unfeasible since it would slow down the blossoming.

THE OPENING CYCLE—Suppose now that it has become necessary for you to rely on using the modern form of da Vinci's leather gadget. This is the situation: you were in afterburner climbing through 40,000 feet at mach .9 when that fuel line parted and JP started gushing inside the tail section. In seconds, the resulting fire has reduced the empennage to an uncontrollable mass, and the only

FREE - FALL

Fig. 3 DECELERATING TO TERMINAL VELOCITY (V_T)

Altitude	IAS—Knots (At Ejection)	Deceleration Time to V_T (Seconds)	Deceleration time to V_T + 5% (Seconds)	Free-fall Distance During Deceleration (V_T)	Free-fall Distance for V_T + 5%
20,000′	600	22		7,700′	
	400	20		6,400′	
	200	18		5,200′	
15,000′	600	21		7,000′	
	400	19		5,800′	
	200	17		4,650′	
10,000′	600	20	10	6,400′	1,600′
	400	18	9	5,200′	1,300′
	200	16	6.5	4,100′	700′
5,000′	600	16	9	4,110′	1,300′
	400	14	8.5	3,140′	1,160′
	200	12	6.25	2,315′	625′

Average figures for 200 lb. man. Deceleration to V_T from a speed only 5% greater than V_T is quite slow and altitude consuming. For example, decelerating to V_T of 283 ft/sec at 20,000 feet from an ejection at 200 knots IAS (425 ft/sec) takes 18 seconds; but to decelerate to V_T *plus* 5% (or 297 ft/sec) takes only 6.5 seconds—approximately ⅓ the time. NPU advises that, below 20,000 feet, Navy parachutes will safely withstand opening at 105% of V_T. At 5,000 feet, 600 knots ejection IAS, this means the difference between falling 4,110 feet while decelerating to V_T, or falling only 1,300 feet while slowing down to V_T *plus* 5%.

CONTINUED FROM PRECEDING PAGE

course of action left is to reach for the face curtain—fast!

You have single-point ejection, automatic lap belt separator and automatic parachute opener, so the big question is can you take the transition from an air-conditioned cockpit into a mach .9 unprotected airstream of —67° F? Some (by no means *all*) aero-medical experts state that you can't do it — that a man's body cannot be subjected to these forces without internal damage, but here again they will also tell you that there is no exacting limit because it varies radically with the differences in individual physical makeup. But there's no doctor here with you, and you have no choice—so you go!

You hit a 515-knot (870 ft/sec) frigid blast and immediately start decelerating. Just ¾ of a second later, the lap belt separates and, if you are not lashed to the seat with the oxygen tube-shoulder strap loop, you and the seat part company quickly. Your bailout bottle was actuated when you ejected, but the wind snatched the oxygen mask off your face! You're bruised and you're scared, but you're still alive and full of adrenalin—and what you do now will determine whether you stay alive or get to the ground DOA (dead on arrival).

It will take about 25 to 30 seconds for the deceleration to terminal velocity of your body. During these seconds, you will have dropped about 8,000-10,000 feet. You're tumbling, spinning and tossing. *It's not easy!*

But, pull your ripcord now and it would be the last thing you did in this world. Should you get the ripcord pulled, the blossoming canopy would hit you with 35 g as it—and you—failed, materially.

What you must do is stop that head-over-heels tumbling which is forcing the blood into your head until you feel consciousness slipping away. You must also get down to lower altitude fast!

Sky-divers perfect the art of controlling the body position at terminal velocity and even perform artful maneuvers during free-fall descents. You must sky dive with the best; arch your back and spread your arms and legs stiffly. The arched back creates an airfoil across the top of the body and pulls it into a horizontal position. The arms out and slightly forward provide balance and stop gyrations. And all the time—time when you're *literally* holding your breath to conserve oxygen stored in your lungs—you're getting down to survivable altitudes.

Fifty-seven seconds—call it one minute—after you ejected at 40,000 feet, you will be free-falling through the —12°F warmth of 20,000 feet and can breathe without hazard of hypoxia. But if you had been floating down under a canopy—provided that Fate had permitted it to open and stay with you—the same trip from 40 to 20 thousand would have taken 10 minutes. This slow trip will kill even the heartiest jumper!

From 20,000 to 10,000 feet takes 33 seconds, free-fall. You still have a 57.6-second trip from 10,000 to sea level without a chute; 7½ minutes to do the same distance with the chute open.

PRESETTING OF 10,000 FEET—Here is the altitude preset in the aneroid of the automatic opening device on the parachutes. Arriving at this height from someplace up yonder, the parachute realizes that the jumper's chances of relating the particulars of this jump in person before the Accident Board are 99+1/100%; there is a wide margin of safety between the terminal velocity of the jumper and the design strength of the canopy. The opening shock will be a short-term, cushioned 8.5g.

Everything is in readiness, so with a muffled report of a time delay cartridge or the thud of a power compression spring (depending upon the type of opener) that the jumper should hear in the quietness of lower space, the actuator will actuate and the chute blossom.

To date, there have been no operational failures of the automatic openers when they have been armed during seat separation. They're extremely reliable when properly rigged. But should misrigging or severe atmospheric conditions cause a failure (if after hearing the "click" or "whiz of gears," no friendly tug arrives in 5 to 6 seconds) pull the ripcord at your convenience during the next 20 seconds.

A CASE IN POINT—The autopsy performed during the investigation of an unsuccessful ejection from an FJ indicated injuries and severe surface abrasions in a pattern suggestive of great force applied to the parachute harness.

The pattern of damage to the canopy indicates progressive failure: gores 1 and 22 (normally the outside gores of the folded canopy) appeared to have been the points of initial failure.

Based on the type and extent of damage, the investigators

concluded that: the parachute container was opened as a result of pulling the ripcord—it did not open because of windblast. The canopy was damaged as a result of deployment and opening at excessive speed or altitude (or both), it subsequently collapsed and failed to reopen due to the extent of damage. The pattern of damage to the canopy and injury to the pilot is more indicative of excessive speed than altitude at the time of opening.

AUTOMATIC OPENERS — The Master Specialities and the Irvin automatic openers are a boon to a jumper's safety. Arm injuries or unconsciousness during the ejection free-fall period could prevent manual opening of a chute—but the automatic opener doesn't forget, it functions! When it's armed by the automatic lap belt, and when it senses that the altitude is 10,000 feet or below, it operates. There is a 3-second delay set in to provide low-altitude, high-speed ejectees sufficient time to slow down to safe deployment speed before the ripcord is pulled. Then 1.7 to 2.5 seconds later, the canopy is inflated, and the rate of descent is about 21 feet/second.

This brings in two points for consideration in low altitude jumps—again safeguards on continuing longevity: (1) get the nose of the airplane up and slow the aircraft before ejection (see "When You Gotta Go," January 1957 APPROACH), and (2) REMEMBER—if for *any* reason you manually open the automatic lap belt (before it opens itself in ¾ second), then you MUST manually pull the ripcord; you have de-armed the automatic parachute opener!

A fully automatic ejection and chute opening from a nose-up attitude at 500 feet is possible! From 1000 feet, nose up, a successful ejection is highly probable.

Continued next page

F7U ejection without automatic equipment; pilot's statement—

"I GRABBED the face curtain and ejected. I left the aircraft and felt that I tumbled forward face down.

"After this, tumbling did not appear to be so violent. Approximately one second after ejecting I let go of the face curtain with my right hand and reached down and opened my seat belt. As the lap belt opened, I let go of the face curtain with my left hand, and as soon as I had my right hand free of the lap belt buckle I immediately pulled the ripcord. I felt a heavy opening shock which tossed me about momentarily.

"After the chute opened I looked up and saw that *several* panels of the parachute had ripped. I also noticed that my shroud lines were twisted and was unable to untwist them. I landed with rather a hard bump."

EXAMINATION of this pilot's parachute showed that four shroud lines were broken, seven panels from three gores were ripped out, one gore was split, and the skirt was ripped away from several panels. Graphite and zinc chromate stains on the chute showed the damage had been done by the ejection seat.

The apparent cause of the chute fouling the seat is that the pilot pulled the D-ring immediately after releasing the lap belt.

Some delay is required to allow time for the seat to fall away and for the pilot to slow down. Automatic equipment will overcome this problem *except* for the fact that it is possible for over-anxious pilots to manually override the automatic releases. This is inadvisable under most circumstances. Give your equipment a fair chance.

CONTINUED
FROM
PRECEDING
PAGE

SUMMARY—The rules for that vital success associated with a high altitude ejection are:

1. go when you must, and don't debate the issue, but . . .
2. chop throttle to slow the airplane, if it is controllable, and descend in it to at least 18,000 feet, if you can . . .
3. if you can't, eject and free-fall (out of the seat)
4. if you lose your oxygen mask or bailout O_2, grunt-breathe to 18,000 feet (see page 5, Parachute Sense pamphlet, NavAer 00-80Q-5, 1944 — but disregard the comment to pull the ripcord at 18,000 feet)
5. stop any tumbling by a modified swan dive position.
6. trust your automatic equipment—it works!

NC-2—(Generally referred to as the QAC Quick-Attachable, Chest). This is a quick attachable chest chute with a 28-foot canopy. This chute is usually stowed in the aircraft and can be attached quickly to fittings on the harness just prior to jumping.

NC-3—Essentially same as NC-2.

NS-2—(Generally referred to as a QFS Quick-Fitting, Seat). This is a non-integrated seat type parachute with a 28-foot canopy and a quick fit harness.

NS-3—Essentially the same as the NS-2.

NS-4—Similar to the NS-2 and NS-3, but is an integrated chute which attaches to the integrated toso harness suit, currently for one special application.

NB-2—(See NB-3).

NB-3—(QFB Quick-Fitting, Back). It has a 28-foot canopy and pin-closed container. (NIS present time, more info on NB-2/NB-3 in a future issue.)

NB-4—This quick fit back type parachute is the only chain or zipper closed chute in use. It has a thin back pack and a 26-foot canopy.

NB-5—This is an integrated back type chute with a pin-closed, high speed pack. It uses a 26-foot canopy.

NB-6—This is a non-integrated quick fit version of the NB-5.

NB-7—This chute is the same design, but slightly thicker than the NB-5, and employs a 28-foot canopy.

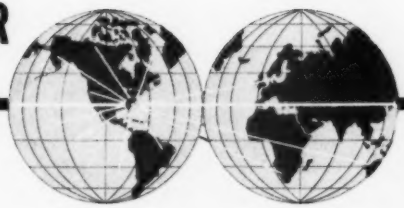
NB-7A—Especially configured for some F8U aircraft.

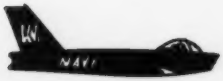
NB-8—This is a non-integrated quick fit version of the NB-7.

At present only two aircraft, the A4D and the F8U are using the integrated back type parachute. Soon, however, this type of chute will be employed in other aircraft.

Automatic parachute actuators are being employed extensively. They provide fully automatic actuation of the parachute ripcord independent of the manual cord, however, the parachute can also be used in the conventional manner with a manual ripcord.

MONITOR





EXCERPTS FROM REPORTS BY NAVY SAFETY COUNCILS THROUGHOUT THE WORLD, WHO PROVIDE LOCAL LEADERSHIP AND EMPHASIS TO THE NAVAL AVIATION SAFETY PROGRAM.

Time Out

While snooping around the flight line I noticed a pilot starting an aircraft that was parked next to one where refueling was in progress. THIS IS A DANGEROUS PRACTICE. It could be possible to start a pretty hot fire in this manner! Wait a few minutes and live longer.—*NAS Grosse Ile*

Photo-bug Passengers

Although you may think it impossible, it has been established that photo flash bulbs can be induced to fire by airborne search radar. It CAN happen! Obviously then, bulbs should not be carried in your stowed luggage. As a further recommendation; it is suggested that bulbs carried in camera bags be wrapped in lead foil. And *never* carry ammunition, dynamite or TNT; it makes the plane commander nervous—*1st MAW.*

Collateral Duties

Heavy attack aircraft are among the few carrier aircraft which have an additional person, besides the pilot, in the cockpit. It cannot be emphasized too strongly that maximum use should be made of this extra pair of eyes. It should be doctrine for the bombardier/navigator to monitor the pilot in all landing approaches—observing the instruments if the pilot is VFR, or looking out if the pilot is flying by instruments. He should be able to give timely warning should a dangerous or unsafe situation develop.—*Sanford Safety Committee.*

Who's on Board?

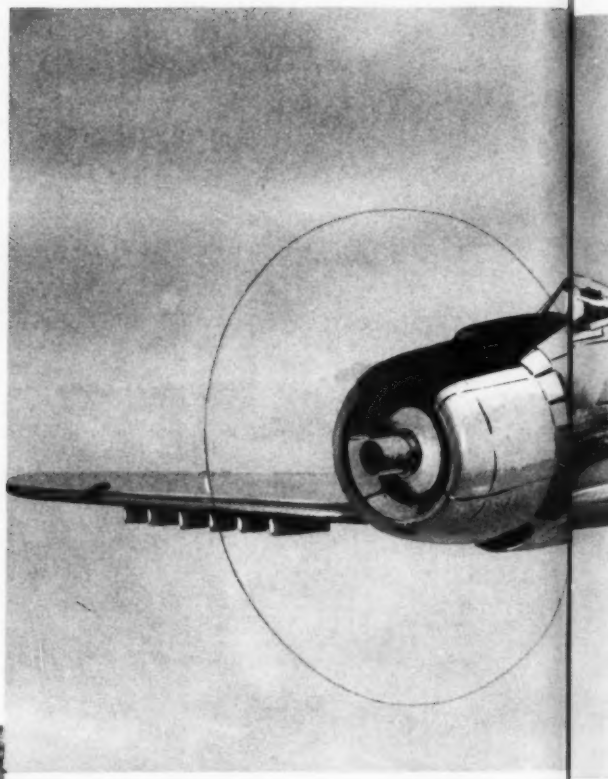
Cited case of SNB which departed with two pilots and three enlisted men to pick up an injured member of a crash crew. One man listed on flight plan stayed behind after picking up injured man to return to Corry. SNB then struck a Dempster-Dumpster while taxiing and the man who was *not* in the plane was still listed on flight plan with no change ever being made. A simple voice call to the tower could have corrected this immediately, rather than discovery by an aircraft accident investigation.—*CNABaTra*

Arresting Gear

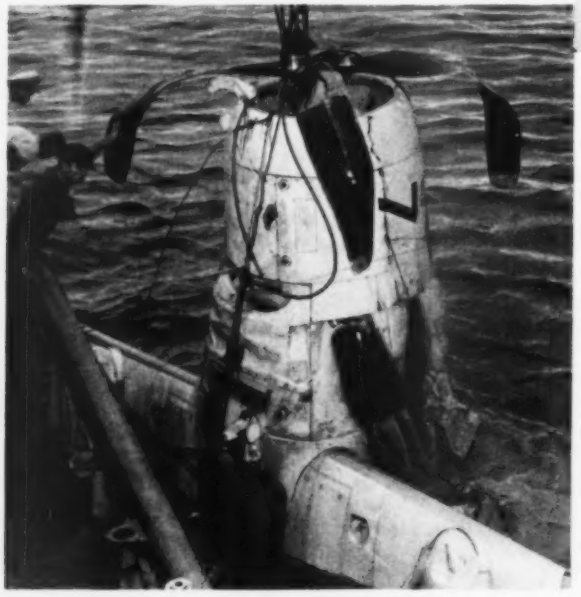
The committee briefed the council on an F9F aircraft which utilized the emergency runway arresting gear at NAS Memphis. The aircraft engaged the wrong arresting gear, resulting in aircraft damage. The committee recommended that pilots be again briefed on the fact that runway emergency arresting gear can only be engaged in one direction, due to the manner in which the anchor chain is faked down.—*NATechTraCom.*

Truth and Consequences

A DIGEST OF SIGNIFICANT AIRCRAFT ACCIDENTS

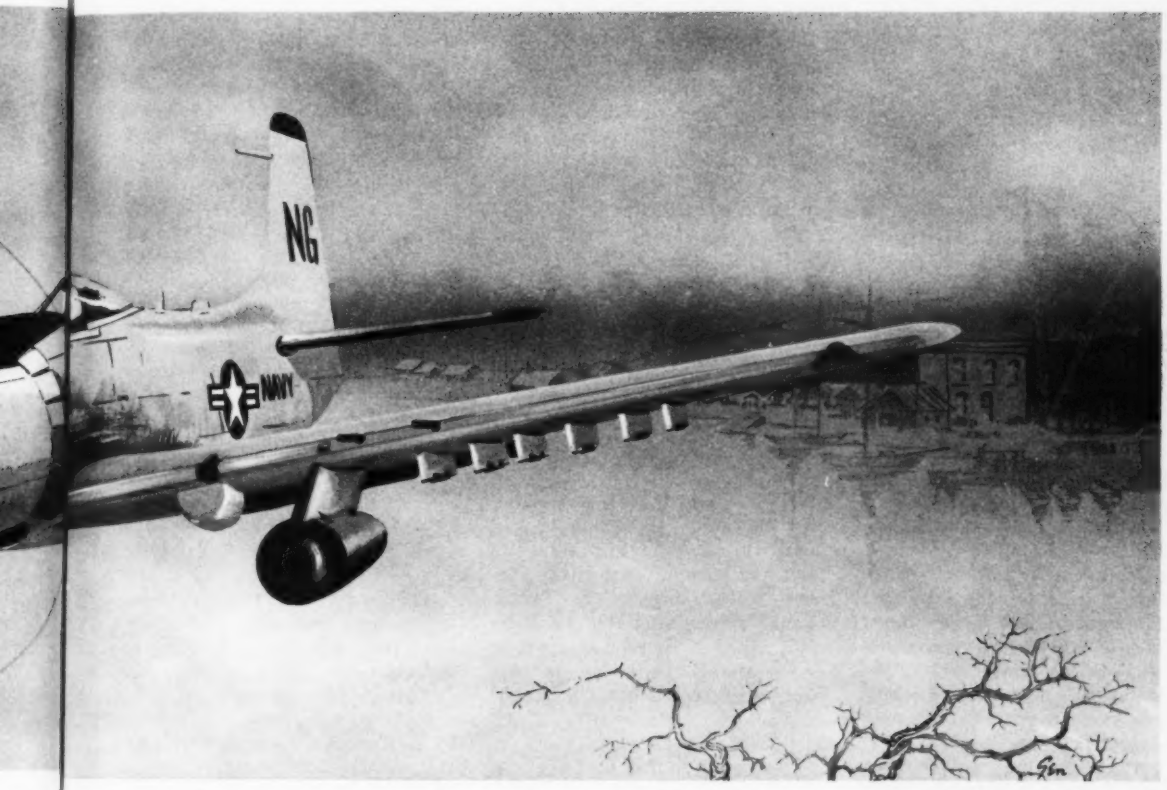


. . . the pilot didn't see a steel cable stretched across his path . . .



TRIPPED—After an uneventful half hour of simulated instruments the wingman of a flight of two AD's took the lead. The aircraft were at between 1000 and 1500 feet and, according to the accident report, the new lead pilot "immediately began scanning the area for a target suitable for a low level run." No low altitude flying was authorized.

While the pilot is looking for a spot, let's have a closer look at him. He had a total of 1250 hours with slightly over 1000 hours in the AD. This time had been gained in two years as an aviator but in the last few months he had been in a proficiency billet and



averaged only about 5 hours a month. He was characterized as a normal average aviator who showed an aggressive attitude.

A small island shipyard received the dubious honor of being selected as the target and another island nearby was chosen to serve as the initial point. In the opinion of the pilot the shipyard was an outstanding target for a half-cuban-eight practice run. He increased power to 35 inches, 2400 rpm, and rolled in toward the I.P. The AD roared over the island, 20 feet off the deck, with the speed accelerating through 230 knots. The second AD pilot followed in a loose wing formation 150 feet off the starboard quarter.

Immediately upon passing the island the lead pilot experienced severe vibration in his aircraft which he attributed to a rough running engine. A power reduction with the mixture in rich did not stop the vibrations and he decided to ditch. He was picked out of the water uninjured.

The cause of the vibrations was a ⅜-inch six-strand steel support cable which the plane hit dead on. *The pilot felt that this type of accident could be prevented only by conducting half-cuban-eight maneuvers at least 800 feet above surface.*

GLIDE PATH—Two AD's on a cross-country were cleared IFR to remain VFR on top and were briefed to expect a narrow front with maximum tops at 14,000 feet about two hours after takeoff. Early in the flight however, they met tops much higher than briefed and continued a slow climb to stay VFR. About an hour and a half after takeoff, the two aircraft were at 16,000 feet. No en route on top reports were available from ground stations.

At this time the wingman realized he had drifted nearly a mile behind the leader. He added power but closed up very slowly.

Continued next page

CONTINUED FROM PRECEDING PAGE

By the time the AD's were joined up they were at 20,000 and the leader commenced an orbit over a range station to obtain an en route altitude from ATC. Upon reaching 20,000', the wingman had gone to full power with 2850 rpm and 33" and was having trouble staying with the leader.

When beginning the second orbit over the range station the wingman's engine suddenly quit. He ran through his engine emergency procedures and checked the engine instruments. Everything was normal except the manifold pressure which was reading from 11 to 13 inches.

The wingman was 500 to 600 feet on top when his engine quit and within a few moments he had settled into the overcast. He leveled his wings on a heading of 90 degrees, switched to Guard with IFF to emergency and broadcast "Mayday." His position was included in the broadcast.

Three stations immediately answered. One was the control tower of the civil airport associated with the range station, over which the AD's had been orbiting. Present weather at this field was given as 3500' broken, 7000' overcast with 7 miles visibility in light rain.

The second station which answered was a military field east of the civil field and the pilot began to follow their heading instructions. A GCI site also answered and reported they had radar contact with the disabled aircraft.

There was only one drawback to the pilot's choice of action—he couldn't make it to the military field; the distance was 78 nautical miles. The accident board calculated later that the maximum dead engine gliding distance from 20,000' was about 43 miles.

When the pilot had glided down below 15,000' the military field reported the aircraft was 65 miles out. According to the board this was the first time the pilot had been advised of the distance. Realizing he had little chance of reaching that field the pilot asked if there was a closer one available. In a few seconds he was given a steer for a civil field about 40 miles away which had 3600-foot runways.

He turned to this new heading but soon discovered the radio range, which he had been orbiting over, was still tuned in on the ADF. Feeling he was closer to the range and its associated field, he reversed course and told the military field of his intentions. They rogered and gave him a steer to this new destination.

It was estimated that when the pilot reversed course he had glided 23 nautical miles and used half of his altitude. At no time did he consider bailing out. The terrain in the area was hilly but the reported ceiling was well above the highest elevation and the pilot felt he would break out under the clouds in time to see where he was going.

"I held 265 degrees and waited," he said. At one point I received a distance of 14 miles (to the field) and I felt sure I could make it . . . My manifold pressure was very slowly rising and at 5000' I had 17 to 18 inches. I began to break out at 4500' indicated and saw rather uneven terrain below.

"Low scattered clouds and light rain caused very limited visibility but . . . I felt sure the field would soon present itself. I was now drawing 20" mp and the rate of descent was down to 250 to 300 fpm with my altitude approximately 800 to 1200 feet above the terrain.

"I decided to drop the fuel tanks, hoping the 2600 pounds lesser weight would enable me to maintain altitude. *I lowered full flaps and slowed to 95 knots.* I spotted a small open field off my port wingtip. With that and the sight of a small ridge ahead that I could not see beyond, I finally elected to ditch . . ."

The landing was made gear-up in an open field about 10 miles from the field. The pilot was uninjured.

The board recommended that a doctrine be established whereby a pilot under similar circumstances, should request a steer to the best weather conditions within his *estimated gliding range. (Do you know the glide ratio for your model aircraft?—Ed.)* Another recommendation was to increase dissemination of the low power glide characteristics of the AD with a view towards elimination of any tendency of the pilot to drop his landing flaps while there is any possibility of maintaining level flight in a clean condition.

The commanding officer commented that in this case, the pilot should have remained on a known fix, over a well equipped large airport, cleared the range and attempted an approach; being sure that he abandoned the aircraft, if not VFR, at least 1000' above en route minimum altitudes.

After answering a lineup correction signal the pilot failed to realign his aircraft—he landed crossing the centerline from right to left.

RUN-OUT — A pilot with 540 total hours and 8 arrested day landings in the F3H-2N was catapulted on a carqual hop. After two passes he had burned down to gross landing weight and continued a mirror approach on an arrested landing. During this approach the LSO had cautioned him over the radio concerning a tendency to slightly overshoot the windline.

After being catapulted again his next pass was a bolter. The pilot's fifth approach appeared to be satisfactory with the exception of his line-up. He was starboard of the center line and the LSO radioed to make a line-up correction.

The pilot eased left toward the center line and caught the number 5 wire with his nosewheel just to the right of the centerline. Arresting equipment was of the constant run-out type and the pilot was aware that this type allows the aircraft to continue in the direction that the aircraft is traveling at the time of engagement.

When the pilot corrected back to the centerline he failed to realign his nose with the deck centerline and landed crossing the angled deck from right to left. After about 212 feet of arresting wire run-out the port main gear dropped off the edge of the flight deck.

AIR-OLOGY—An SNB became airborne in a normal, wings level attitude, and then pulled up into an abnormally nose-high climb. Between 100 and 200 feet it had an estimated 40 to 60 degree nose-up attitude. The *Beech* fell off to the left, rolled inverted, and dropped into a steep dive. The nose then pulled through rapidly but there was insufficient altitude to recover from the dive. All occupants died in the subsequent crash.

Both pilots were considered to be conservative in their flying habits. Obstacle takeoffs in the SNB were not practiced by pilots in the command concerned, besides which, the flaps were up and the gear was extended throughout the short flight. Thus, it was considered unlikely that two experienced pilots would deliberately pull an SNB up to such a steep angle of climb immediately after takeoff as described by witnesses.

After the crash all control cables were traced out and found to be properly rigged, and when crash-caused binding was removed, the cables and remaining tail control surfaces could be moved without difficulty. From an examination of the tail surfaces the rudder tab was neutral and the elevator tab was in a slight nose-down setting, normal for takeoff.

Prop and jet wash was a possibility but not a large one. The most recent dart pickup passes near the runway, made at low altitude and between 180 and 200 knots, had been made 3 to 5 minutes prior to the accident and a 12-knot wind was recorded at the time of the crash. Seemingly, the investigation was blocked. Then, as investigators poked further into the wreckage, a possible answer emerged.

The cabin air heat intensifier tube at the forward wall of the collector ring of the port engine exhaust stack was found completely broken. It appeared to have a rubbed and leaded area extending halfway around the circumference (see photo) which was not crash damage. The force of the crash had broken both engines loose and they had not been exposed to the fire which mangled the forward section of the *Beech*.

When this element was added to the fact that the pilot's cabin heater was found in the full hot position, the investigation took a new direction. If such a failure did occur, it would allow a carbon

CONTINUED FROM PRECEDING PAGE

monoxide concentration to enter the cockpit through the heater system.

In a test, the broken cabin heat intensifier tube was installed in another SNB to evaluate the effect it might have in inducing carbon monoxide into the aircraft cabin. The phases were simulated from start through a high power run to simulate the takeoff.

The exact extent of the intensifier tube failure and the effect the break had on the pilots prior to the accident was not known of course, but after four minutes of the test (simulated taxiing) the air sampling showed approximately .02 carbon monoxide on the Colorimetric type tube indicator. This is maximum allowable for taxiing. At eight minutes, and on every sampling thereafter, the color change showed a full scale reading of .04 carbon monoxide. The pilot and copilot on the test had blood samples taken for carbon monoxide toxicological tests and the results were reported as 2 percent and 3 percent. This is not considered significant by medical personnel, but there is some reluctance to say such a dosage would not affect a pilot's capabilities, due to individual variables involved.

The prime suspect was a broken heater tube which may have caused carbon monoxide poisoning.

It was noted in an endorsement on the accident report that "There is no definite evidence to indicate that carbon monoxide poisoning was the cause of the accident, but at the same time it cannot be completely ruled out."

Another endorsement noted a ComNavAirPac Bulletin will require an in-flight carbon-monoxide check each 120 hours with the heaters in the full ON position. Inspection of the intensifier tubes will be dependent upon the results of this check.

LONG GONE — It was one of those clear crisp mornings so common in the southwestern mountain areas. The temperature was 50° and the tower operator at the air base could record 50 miles visibility without exaggerating. At the moment the winds were light with the anemometer needle swinging lazily between zero and six knots.

In elevation the field was "mile-high." The high altitude was compensated for by runway length. The runway proper was over 11,500 feet. With the paved over-runs on each end there was approximately 14,000 feet of usable hard surface.

At about 0620 the pilot, flying an A4D, called for landing instructions and was cleared to enter the pattern and break. He was given the wind as six knots from the SSW.

Touchdown was made about 1500 feet beyond the numbers leaving two miles of runway ahead. Flaps were pulled up shortly after touchdown. During the rollout the pilot prophetically commented to the tower that "this aircraft is hard to slow down with an external store aboard." At the end of the two-mile run the pilot notified the tower that he was going off the end of the runway and at the same time shut down his engine and held full brakes.

The A4D used up the 1000-foot overrun, ran through 600 feet of hard packed dirt and then came to an area of soft sand. It decelerated very slowly but in the final few feet of forward motion

. . . pilot used his brakes incorrectly in the early part of his landing and had nothing but the pedals left . . .

the nosewheel dug in and the port wheel ran up onto a slight sand mound. The jet tipped to starboard and came to rest on its nose, starboard gear and wingtip.

After the accident both brake assemblies were found damaged by excessive heat and required replacement, as did the brake hoses. The accident board was unable to investigate the possibilities of dragging brakes but they were working properly prior to takeoff and there was no aircraft history of brake trouble.

The board concluded that the primary cause of the accident was pilot technique in use of brakes during the early stages of the rollout, where the speed had not decelerated to an effective braking speed. Excessive overheating occurred and as a result, the brakes were rendered ineffective.

Several out-of-the-ordinary items may have contributed to the overrun.

Past performance of the pilot was characterized by the commanding officer as above average to excellent and he had no record of previous accidents. It was also noted that his subsequent operation of the same model was entirely satisfactory in all respects.

The aircraft was carrying an external store weighing 1200 pounds and this was the pilot's first landing with a heavy store attached. Added to this was 2700 pounds of fuel still in the tanks. The gross weight at landing was estimated to be 13,233 pounds and at this weight the handbook gave an approximate final approach speed of 122 knots indicated. The pilot stated that he used 135 knots indicated. Due to the runway length it was a common practice when heavily loaded to use a 10- to 15-knot higher approach speed than the airspeeds given in the handbook.

An additional point which influenced the use of higher approach indicated airspeeds was the local traffic pattern. Pilots were required to maintain 1000 feet above the field until 90 degrees to the landing runway. The ensuing high rate of descent from that point posed a problem with heavily loaded jet aircraft. Previous to this accident extensive operations had been conducted at the field using A4D's with external stores and no stopping difficulties developed.

Another factor which may have had some effect on the rollout was the light winds which put the actual touchdown speed very close to the true air-speed. •

recent flight violations:

HOW MUCH CAN THE TOWER AUTHORIZE?

The Violation:

". . . . . an F9F-8 requested a high-speed low-level pass over the field. Tower cleared the aircraft . . . . minimum altitude 1000 feet. After passing the field boundary the aircraft started a steep climb and at about 2500 or 3000 feet executed two or three climbing slow rolls. Clearance was not given by the tower for acrobatics within the control zone."

The Report:

". . . . . clearance issued by the control tower is authority for a pilot to proceed only insofar as known air traffic conditions and field conditions are concerned, and does not constitute authority for a pilot to violate any provision of Air Force, Navy or Civil Air Regulations . . . ."

The Consequences:

a. Record of violation entered in the pilot's log book.
b. The pilot was orally admonished by his commanding officer.

LINEUP

"COMING in on a night landing, after having difficulty finding the field, I broke high and took a wide downwind to get the TV-2 set up for landing.

"The landing checklist was complete turning base, then I encountered difficulty lining up on the duty runway through a fogged canopy. Touchdown was made between two rows of blue lights!

"Luckily it was a taxiway paralleling the duty runway. The landing was normal after touchdown."

What was the position of the heat control?—Headmouse.

BLADE STALL

"I WAS preflighting an F9F–5 prior to taking it in instrument weather to a West Coast air station for a 60-hour check. I lazily glanced up the tailpipe and noted a shiny spot about one half inch wide on the base of all the turbine blades.

"I asked the plane captain if he checked it and if the aircraft was ready to fly. He said 'yes.' I had a funny feeling and asked the plane captain if he was a mechanic and he said no. I told him to get the chief mech to check this item and if he said go—I would.

"While the chief crawled up the tailpipe to check the blades I got strapped in. After he crawled out he came up and told me I didn't want to fly this aircraft. The heat dissipating cone had come loose and had worn the turbine blades in half. I might have made the takeoff, but at 100 percent those blades weren't long for that aircraft. . . ."

BACKSEAT DRIVER

"THE passenger in the back seat of the T–28C asked over the intercom how to turn on the cockpit lights. I said to turn the rheostat knobs clockwise on the console outboard of the right knee. Ap-

BIRDS OF A FEATHER

Situation: Simulated instruments in the old *Beechcraft.* One pilot under the louvered hood. Range approach, just short of low station at an actual altitude of about 2500 feet. The contact pilot (on the right side) closed the starboard throttle to simulate an engine failure.

Goof number one: The hooded pilot feathered the starboard engine.

Goof number two: The contact pilot reached across the pilots' compartment to unfeather the starboard engine and somewhere in the shuffle the port engine got feathered!

Goof number three: The machine this time. *Neither engine would come out of feather!*

Results: None, except that a couple of pilots got a lot of education. The hood was removed and the plane was landed with essentially zero power at the field to which the approach was being made.

The pilots who flew this particular machine regularly, stated later that if a pilot feathered an engine he might not be able to get it out. There was no indication of this on the last few gripe sheets, and it ground-checked fine.

Recommendations: Nothing new here. Never feather an engine on a simulated engine failure unless briefed to do so, and then only at an altitude of 5000 feet or above. If an engine is to be feathered, on a simulated or actual emergency, wait until everything settles down and then carefully feather the bad engine. Never let the fingers get in a hurry around those feathering buttons, either to get an engine in or out of feather.

Anymouse

and his hairy tales

The purpose of Anymouse Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hairy or unsafe flight experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in readyrooms and line shacks. All reports are considered for appropriate action. Please send your reports to the Naval Aviation Safety Center, NAS, Norfolk 11, Va., now!

proximately three minutes later the engine backfired twice—flames appeared over the engine cowl.

"I had been cruising at 20" mp and 1600 rpm with 130° cht. Before takeoff the carburetor checked on the lean side so thinking it was causing the backfiring, I went into RICH. In addition, the tower was called concerning the situation. I gave my position and requested to know how soon I could be recovered.

"While waiting for information and instructions I checked the engine performance and all seemed near normal. The landing was accomplished without incident and after reaching the chocks I made a mag grounding check and then discovered the mag switch on *right mag!*

"After checking with the passenger it was learned he had tried to turn on the cockpit lights with the mag switch. Hereafter I will make sure that the passenger is fully checked out prior to flight on any switches, controls . . . which he may need to use."

BLIMP LIMP

"DURING an ASW exercise, we launched about 2130 from NAS_____ to relieve another S2F on station over a sub contact close inshore. The night was clear and black. Takeoff and relief were made without incident.

"About an hour later, base radio advised that we would be relieved on station by a ZP—that's all the dope they had—no ETA, no area, no call sign, no frequency. Knowing blimp speeds, we didn't expect him for several hours.

"All this time we were working over the intersection of several busy ship channels, with ships, blinking channel buoys, a lighthouse, and autos on shore, all presenting a very confusing light pattern, particularly at our low ASW altitude.

"With the copilot flying, I tried to contact the ZP on several channels and guard—no luck. Setting in another channel on UHF manual, I noticed a particularly weird light pattern ahead, but figured it was just more of the red, green, and white channel lights on the buoys blinking on and off in an irregular pattern. About the time it got

CONTINUED FROM PRECEDING PAGE

through to me that particular light pattern wasn't quite right for something on the deck, a searchlight flashed on momentarily right in the middle of it. There was our blimp, looming out of the blackness, dead ahead, broadside!

"I hollered at the copilot to get some altitude, fast! I'm not sure whether he ever did see it but my second action was to take over and horse back on the yoke. I also added enough power to exceed BMEP momentarily and we skimmed over the top of him. This was closer than I ever care to come to anything airborne at night.

"With a little heart-throbbing on my part, and some fancy frequency shifting by one of the crewmen, we finally got through to him on MHF and accomplished the relief. He sounded a little upset; said he had been trying to get us on guard, though we never heard him.

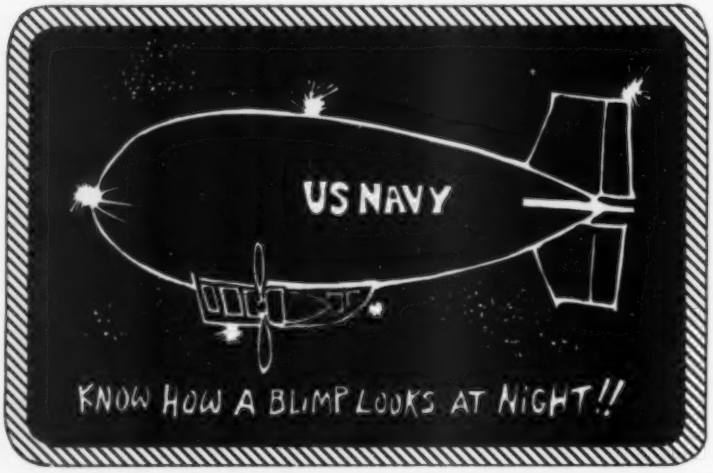
"The incident produced these suggestions for pilots, and ASW pilots, in particular:

"*Find out what a blimp looks like at night*—few of us have ever seen one. It looks like it has normal red and green lights on the gondola plus a yellow one; white lights at either end that look like they're a mile apart when you can't see the bag in between. The end lights and gondola lights flash alternately and I also understand from an ex-P2V pilot that they can be coded. This is mighty hard to spot against lights on the ground—we even lost track of him a time or two after we knew he was there.

"*Maintain at least 1000* feet if there's even a possibility of a ZP in the area.

"*Use all the eyes* you have available in the cockpit. A good idea is to keep a scan going when you have anything to do in the cockpit—looking at RadFacs, using the relief tube, setting in a frequency, can be done quite adequately a little at a time, with a glance around outside every four or five seconds, day or night.

"*When something doesn't look right, do something about it right now*, instead of waiting to see if it's worth worrying about."



FOUL FOUL-UP

"THE flight had just gotten back from a 5-hour ASW mission and it was dark," said bystander Anymouse. "I was landing behind the subject aircraft. After landing he was cleared to turn off at a taxiway about halfway down the duty runway. In so doing, he missed the taxiway about 100 yards and ran off the runway. The nose was in a small ditch and his tail was out on the runway.

"I rolled around him and went on to squadron line where I informed the SDO of the situation. In the meantime, the tower changed runways and sent a tractor out to pull him out. The tractor experienced considerable difficulty pulling him backward until it was finally discovered that the emergency brake was still ON.

"When the tractor finally got him pulled back on the runway the pilot stated he could taxi back to the squadron line under his own power and the tractor chugged off. However, when the pilot tried to start his engines, he discovered that he had no battery power because he had left his exterior lights ON all the time he was in the ditch. In trying to start his engines, he pulled the battery down completely so he no longer had exterior lights or radios.

"Meanwhile, back at the tower, the tractor crew reported that the aircraft was back on the runway and was going to return to his line under his own power. So, the tower changed back to the duty runway and turned on the runway lights. They were unaware that an airplane was sitting right in the middle of the jet runway about halfway down with no lights or radio!

"Well, when the copilot saw the lights come back on, with him sitting disabled in the middle of it, he assumed the worst and took off running for the tower to warn them, and I suspect, to get the h___ out of the way in case something did land on the supposedly clear runway.

"He got there in time and a tractor came back out to pull the plane back to the line.

"This sad tale should end there, but the pilot neglected to down the plane for a drop check to see if

there was any damage to the gear. Bright and early next morning the plane was flown. Luckily enough, there was no trouble.

"This comedy of errors turned out okay, but the possibility of what might have happened sort of frightens me. I keep thinking of what would have happened if a transport loaded with people had landed on that supposedly clear runway or what would have happened if the pilot flying the plane the next day couldn't have gotten his landing gear down."

KNOW NOW

AFTER launching in a P5M, ATC advised a considerable delay was required to obtain IFR clearance. During the two-hour wait all of the pilots (4) practiced buoy approaches and other water work. We were finally cleared on a 670-mile ferry flight at 1100. At launching time, 0845, approximately 1850 gallons of gas were aboard, 350 of which were estimated to be in the port bomb-bay tank. We burned approximately 120 gallons on the water prior to takeoff but still had 1730 gallons for an estimated 4.5-hour hop. The P5M uses 200 gallons per hour in normal cruise plus 150 gallons for takeoff and climb. This would give us a 680 gallons reserve if the trip went as expected.

It should be noted here that this aircraft was being turned in for overhaul and had been AOCP for 3 months prior to this flight. At that time parts were scarce at overseas bases so this boat was the ready-issue ship for any and all comers. Only marginal equipment was reinstalled for this hop.

Weather at destination was reported good with the possibility of a cold front entering the area late in the afternoon or early evening.

Takeoff and climb to 5000' were normal and we were on our way. After about 1.5 hours of flight LORAN fixes showed us a few miles left of course and at a somewhat slower ground speed than predicted. Heading corrections were made. Sun shots were taken to verify fixes and they proved reliable. Shortly thereafter, an undercast precluded any more drift-sight observations. Loran fixes were continued for another hour showing us still to the left of track and again corrections were made. At this time (2.5 hours out), the Loran failed completely. Also an overcast obscured the sun and we were between layers. Navigation was limited to D. R., and predicted winds were not too reliable. (The overcast and undercast were not predicted.) Using the last known wind between fixes we continued with about 400 miles to go.

After 3.5 hours out internal weight was down to single-engine recommended weight and I decided to transfer fuel from the port bomb-bay tank. (Only the port tank was installed.) All attempts to transfer fuel from this tank were unsuccessful. This cut our reserve from 680 to 330 gallons, equal to almost two hours of reduced power flight at the lighter gross weight reached at destination. Our alternate was only 25 minutes flight time from destination.

As we were nearing the coast (4.5 hours out) attempts were made to obtain radio bearings but to no avail. At this time, I notified the overseas control station that our navigation was doubtful but that I would continue toward the coast rather than turn back and hunt for an island in the middle of the ocean with nothing but unreliable DR navigation to depend upon. Shortly thereafter, I contacted Air Defense radar and asked for steers. They could not identify me but requested I maintain contact with them and they would relay position reports to overseas control. It was later borne out that we were approximately 190 miles from the coast at this time. We were "in the soup" at this time also.

Approximately 5.5 hours out we were identified by Air Defense radar some 110 miles out but 70 miles to the right of our predicted course. Ground speed was 100 knots and our fuel reserve was down to 80 gallons or 24 minutes.

The cold front had arrived at my destination and the weather was closing rapidly. I requested an immediate ASR approach to the seadrome and was shortly cleared to descend on a direct course to the holding fix for an ASR approach. All preparations were made to handle me at destination. As it turned out, I didn't have fuel to take even one waveoff.

I contacted ASR and requested a straight-in approach which was denied due to wind direction on the surface. The surface winds were 120 degrees different from the winds at altitude. Ceilings were reported variable between 50 and 300 feet. Visibility was 1 mile reducing to ⅛ in showers. We broke out of the ASR approach under a small shower and landed safely.

During the approach to the buoy the APU unit quit from fuel starvation. Had this occurred during flight only 50 seconds of fuel would have been left.

Total time from takeoff to on the buoy was 7.3 hours.

Hints to P5M Pilots:

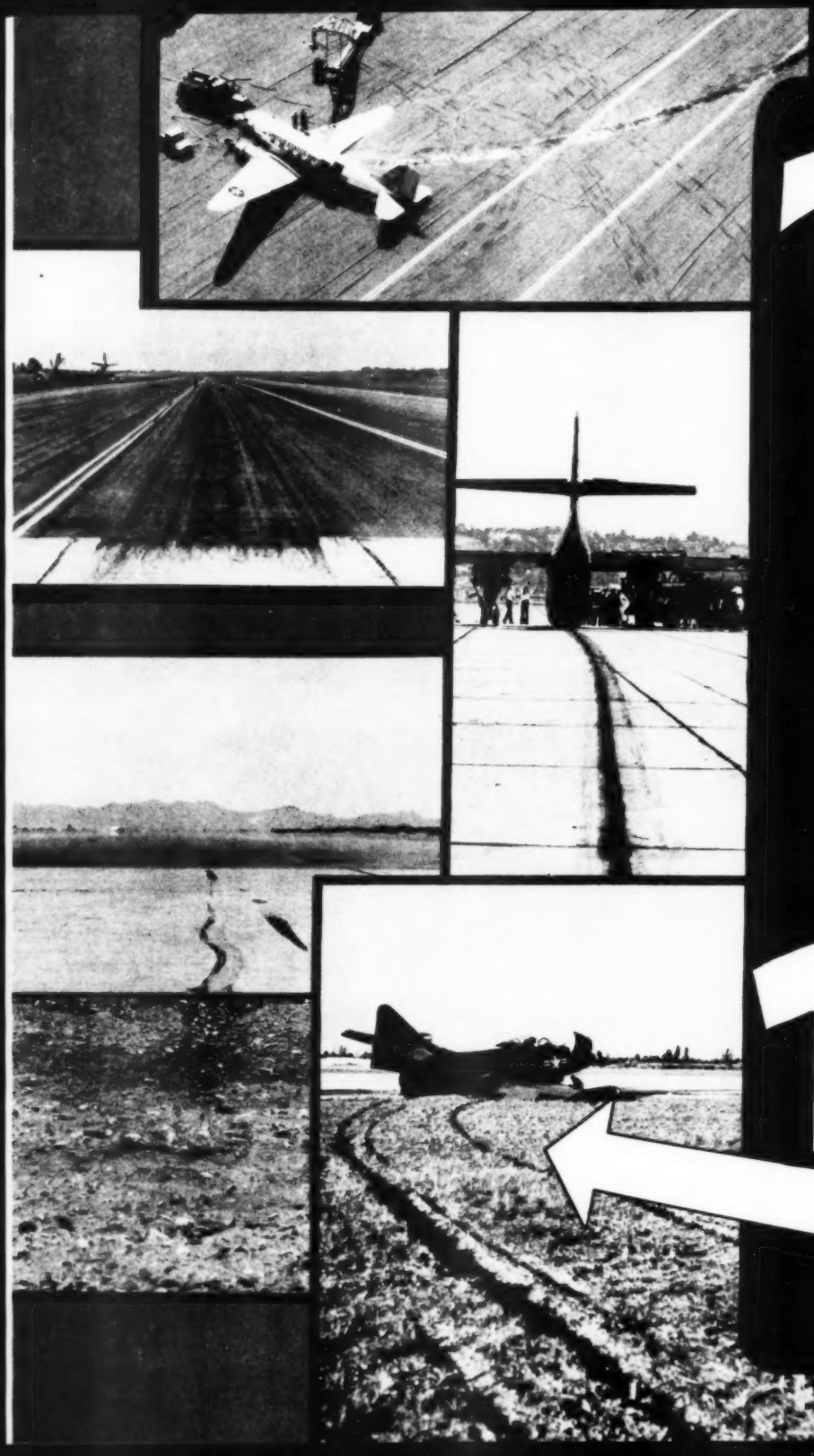
(1) When prolonged waits on the water for clearance are experienced either tie up to a buoy somewhere or be prepared to top off with fuel at the ramp prior to departure.

(2) As soon as possible after takeoff, check all transfer methods before proceeding too far.

(3) Use recommended maximum range power settings and recalculate for at least each hour. This really saved us.

(4) Watch errors introduced to the howgozit by faulty navigation, inability to use fuel from certain tanks, etc. The new P5M howgozit charts are really great for this. In this case we might as well have figured the 350 gallons used which would have put us far below the red line.

(5) Watch those dog ships that have been the ready issue ship for the squadron. They're loaded with all the gear nobody can get to work.



THEY W

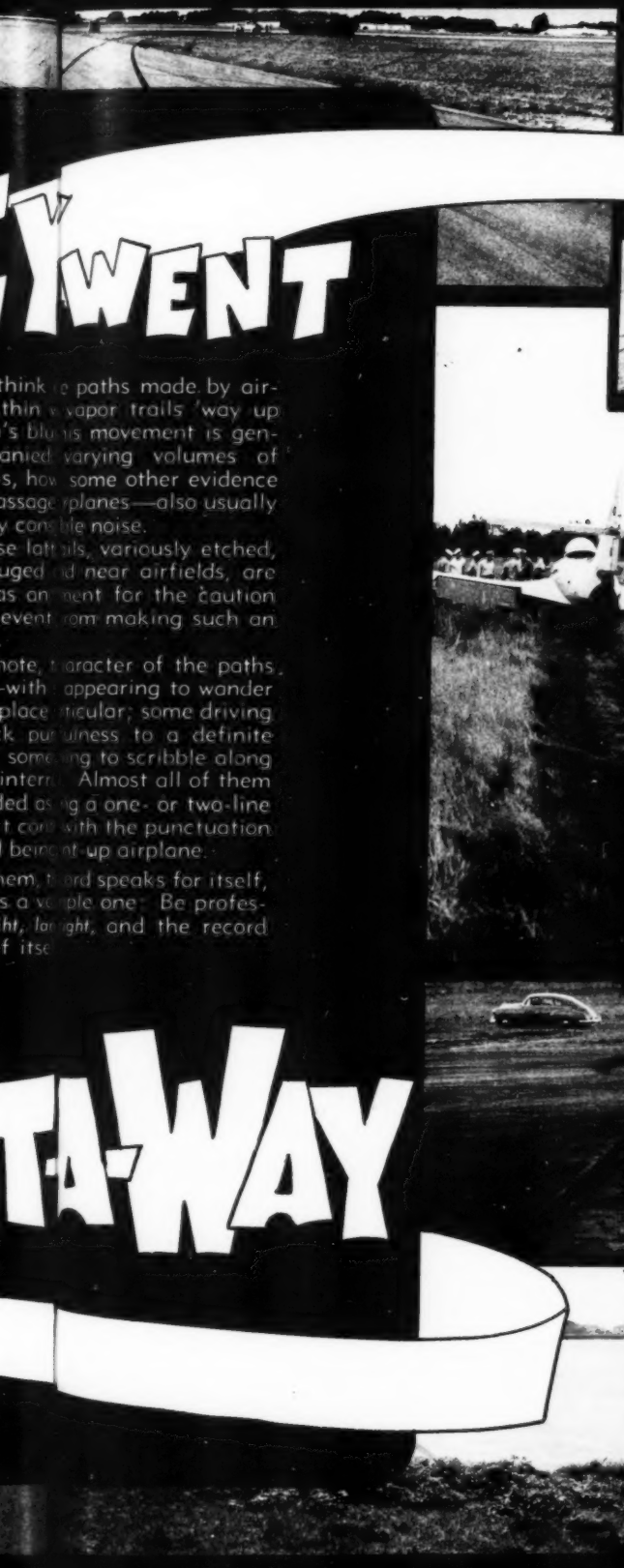
WE usually think o pa
planes as the thin v vap
in the birdmen's blu is n
erally accompanied vary
sound. There is, hov som
of the recent passage rplan
accompanied by con ble n

Some of these lat ails,
plowed and gouged ou n
pictured here as an ment
necessary to prevent om
un-pretty mark.

As you will note, t ora
differ greatly—with app
aimlessly to no place rieu
with bold, black pur uine
conclusion, and some ing
nervously until inter Al
might be regarded as ng a
lesson in aircraft con with
mark at the end being nt-u

For most of them, t ord
and the lesson is a v ple
sional—*fly it right, la ght,*
will take care of itse

THAT A


'WENT
think e paths made by air-
thin vapor trails 'way up
's blu is movement is gen-
anied varying volumes of
s, how some other evidence
assage rplanes—also usually
y cons ble noise.
se lat ils, variously etched,
uged d near airfields, are
as an ent for the caution
event rom making such an
note, t aracter of the paths,
-with appearing to wander
place ticular; some driving
k pur uiness to a definite
some ng to scribble along
interr Almost all of them
led as g a one- or two-line
t con ith the punctuation
beine t-up airplane.
hem, t rd speaks for itself,
s a va ple one. Be profes-
ht, la ght, and the record
f itse
T-A-WAY

YOUR PERSONAL EQUIPMENT—

AED boss answers complaints

HEADMOUSE

Dear Headmouse:

Pages 26-27 of the September, 1957 issue of APPROACH deliver themselves of a lot of vitriolic comments about pilot's personal equipment. Since the Airborne Equipment Division of the Bureau of Aeronautics guides the research and development of personal equipment, I am answering the anonymous letters in attempt to straighten out what we think are some pretty unjust accusations and statements.

The impression the letters give is that little worthwhile has been accomplished, that nothing is being done to improve equipment, and, as one accuser stated, nothing promises to be done in the future.

In reply to these statements, it will be shown that numerous improvements have been made, are being made, and will be made in the wide variety of personal equipment for which the Bureau of Aeronautics is responsible. It is impossible in this limited space to recount all of the considerations which went into the selection of any one design for production; however, it should be stated here and now that none of the choices have been based upon sheer frivolity or "picking something out of a hat."

It may be worthwhile to point out, also, that the efforts of personnel in this and other technical bureaus of the Navy Department are guided by practical officers, experienced in the workings of the fleet and knowing, first hand, what the problems are. In the Airborne Equipment Division of BuAer, for example, there are no less than ten unrestricted general line Naval Aviators, the senior of which is your writer, lately Aviation Safety Officer on the Staff of ComNavAirPac. To assume for one moment that any or all of these officers, to whom the personal problems of the common ordinary pilot are identical to their own, has suddenly lost all loyalty to shipmates in the Fleet by virtue of orders to Washington, is simply ridiculous.

To go on with the specific gripes expressed in the letters to APPROACH, the first to come up is the APH-5 helmet.

The APH-5 Helmet

There is a surprising difference in head shapes; all one has to do is look around and see for himself. From the beginning, two methods of accommodating all types suggested themselves: first, fit each man individually; or, second, adopt a standard form which studies showed would fit the majority, making minor adjustments with interior pads to achieve the greatest comfort and protection. The first method was thrown out because of expense and, more important, the inability to come up with a system in which accurate individual casts of heads could be made out in the field with the talent available. Here the problem was not the helmet but the shock-absorbing liner material, it proved almost impossible to center the skull within the helmet each and every time.

When the second helmet concept was designed, a research and development contract was given to Mine Safety Appliances who built 50 prototypes. These were farmed out for testing to the Naval Air Material Center, to the Air Crew Equipment Laboratory, to NATC, Patuxent, to the parachute unit at El Centro, to VX-3, to Project Cutlass, to VF-142, to FAWTUPac, and several other activities. With all this experience backed up by mighty specific question-and-answer type comments from the large number of pilots who tested the helmet, the prototypes were modified and wound up into the standard APH-5 which was then specified as acceptable for the first production.

In the "grass is greener—" vein, a lot of pilots talk about the Air Force helmet as being superior. Is it? We have been in constant touch with the Aero Medical Laboratory at Wright Air Development Center and came up with some interesting facts. After testing the APH-5 exhaustively, the Lab is requesting the Air Material Command to get 8,000-10,000 APH-5 type helmets for USAF pilots in FY 1958. They have recommended our model as the tentative Air Force Standard. As soon as studies on operating techniques are completed, as well as sizes required, they will recommend that this helmet be *the* standard. Furthermore, after a searching examination of their own P-4A helmet the Air Force came to the following conclusions:

a. Their own helmet lacks fit adaptability; the APH-5 being better in this respect.

b. Their helmet received more complaints of discomfort and pressure points.

c. The APH-5 provides much better head and skull protection.

d. The APH-5 is less bulky

and is lighter in weight.

Turning to Army experience, only 300 Navy type helmets are being procured due to fund limitations; however, need is 8,000-10,000 again. These will be used in everything except military transport type aircraft.

The above "other service" acceptance of our APH-5 helmet, we feel, is a strong indication that we have the best in the business. Furthermore, as remarks below will show, we have not run out of either ingenuity or the desire to continue improvement.

APH-5 Fitting Techniques

As remarked before, the actual shapes and sizes of helmets procured were arrived at only after extensive research. Fitting techniques were developed to accommodate those knobs and bumps which every skull has, but as was expected, the best was not obtained on the first try.

A good fit, plus real protection, means cutting down air circulation around the head and the development of perspiration. Pilots complained about this, but until we can find some material which has all the qualities that a liner material should have, plus resistance against perspiration decay, we can only recommend that liner pads be pulled out and replaced as often as necessary. Extras should be available now in the supply system. Some persons have certain substances in their perspiration which rot almost any material held in close contact; others do not. This is an individual problem and each pilot will have to replace his own linings whenever they decay. Linings can be peeled out and stuck back in easily since the helmet side is coated with pressure-sensitive adhesive.

Smaller-area, leather-covered sizing pads are being evaluated in conjunction with a blower to provide ventilation around the head and assist in cooling. This will also solve the problem of ripe-smelling pads.

Earcups

One of the points of complaint on the APH-5 helmet is the earcup and phone assembly. Almost every case where one of our personnel has examined a helmet about which a complaint has been registered, it turns out that a proper fit was not made in the first place. The earcups can be loosened by a setscrew and moved about considerably in many positions to accommodate individual differences; furthermore, a series of shims is available to provide lateral adjustment in addition to cocking. All in all, there are FOUR adjustments that can and should be made. However, it is necessary that the pilots take the time and trouble to get fitted right; it just isn't reasonable to grab any old helmet off the shelf and expect it to work perfectly the first time. BuAer Clothing and Survival Equipment Bulletin No. 5-57 dated 4 June 1957 delineates the proper fitting techniques to be followed.

In the older earcup assembly, a flat cup and round rim have been evaluated for close fit around the periphery of the ear. Now we have a most promising new design which is coming up and involves a pliable plastic "inner tube" filled with a non-freezing mix of glycerine and water. The beauty of it is that the liquid just flows around high spots, fills in the low ones, and applies an even pressure all the way around. There is an excellent decrease in random noise entering the cup also. This is the most comfortable and effective earcup idea we've seen in a long time.

On the subject of earcups, one anonymous writer stated that a close fitting cup would "rupture" eardrums. This is a little hard to do because the earcups are not sealed either at the screw which holds them on or at the electrical leads which connect the phones. A check of medical history shows no case of trouble in this regard.

Oxygen Mask Retention

When an oxygen mask is used, the chinstrap should be cinched up after the mask is positioned on the face. However, the tightening of the mask gives the pilot a false sense of security, and we find that many are letting the chinstrap hang loose. Christmas-tree clips (Hardman system) have been authorized for attachment of oxygen masks to the APH-5 helmet. This replaces the present chinstrap. There is a good article on this subject on page 30 of the August 1957 APPROACH—it should be read by all helmet users.

Visor

There are two ways to build a transparent visor for the pilot's helmet; first, make it so thick and strong that it can take a beating from any blast of air, or, second; make it much thinner so that it deflects easily without shattering.

The first alternative appeared

CONTINUED FROM PRECEDING PAGE

less attractive than the second because of weight, bulk, and safety considerations. In a crash, the brittle plastic would likely shatter into many small, dangerously sharp fragments.

The second solution turned out to be the best. Under strong blasts of air the flexible shield warps and bends but does not break; in crashes, its chances of shattering are low while the saving in weight enabled a total reduction in APH-5 size due to requiring less room in the forehead housing. Incidentally, the latter method of housing the visor was selected to prevent cutting slots into the basic helmet and thus weakening it. It also provides additional protection over the area of the skull most likely to need it in the event of a crash.

Insofar as the optics of the visor are concerned, one top man in the optics field stated that they were the best he's ever seen. As one parting item before we leave the subject, if the lowered visor extends beyond the nose, or at the other extreme, rests upon the nose, this is a strong indication that the helmet is improperly fitted.

Parachutes

The present 28-foot flat circular parachute used in high speed fighters is the best and most reliable available today in the Navy, and the Air Force is readopting this chute. The NB-7 and NB-8 containers represent the latest in packs with high velocity wind blast integrity.

The integrated parachute system made its debut in the A4D and gives the pilot a better fit in a small cockpit. Since it is a new item, the integrated system naturally has some minor problems which are being overcome. In spite of drawbacks, however, the many outstanding advantages make it the most desirable system for incorporation into newer aircraft.

Mae Wests

It is assumed that the term "hardware store" Mae West has been selected by one of the complaining writers to describe the large number of accessory items attached to the MK II life vest. These include: shark repellent, whistle, pin-on light, dye marker, and pyrotechnic signals. All of these items have saved lives in the past, and in fact, are in existence solely because pilots wanted and still want them.

However, it doesn't take a pilot to recognize that a bulky vest is undesirable if any way can be taken to reduce either the size of the individual items, their number, or to arrange them in better fashion. In the MK 3C underarm life preserver, for example, currently under development and designed ultimately to replace the MK II, the reduction of bulk was so necessary that some accessories had to be reduced in number. The only items incorporated are one dye marker and two pyrotechnic signals.

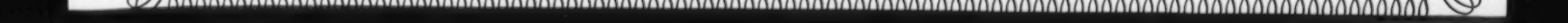
Recently, an attempt was made to reduce the size of pyrotechnic signals by either compressing the powder further or by re-shaping the charge. The first proved to be impossible but the second seems feasible. It is expected that the cylindrical charge will be flattened into a flask shape so that it fits more snugly against the vest. In addition, the reliability of operation, adopting a more certain means of distinguishing between night and day ends, and simplifying the method of actuation will also be restudied.

In closing, dear Headmouse, we hope that a satisfactory answer has been given to the letters sent you. We appreciate that you receive many comments from anonymous sources concerning personal equipment but whether this is the way to accomplish results is debatable. It seems that the original purpose of Anymouse has been lost sight of. Where once it served the valuable purpose of bringing to light errors committed by pilots without causing them embarrassment, it now seems to have altered into a sounding board for gripes, too many of which appear irresponsible.

We are inclined to believe that legitimate complaints should be made the subject of formal correspondence since this is not only the approved method but also one which requires writers to think twice before they affix their signatures. We regret to see wholesale condemnations of equipment published in an officially-sponsored periodical because this implies that the complaints are valid, that the approved methods of doing business are no longer adequate to obtain relief, and that hundreds of persons within the specific field of interest are ineffective. These implications can only result in harassment of the technical personnel involved and the lowering of morale both here and in the fleet. We are, as always, ready to receive correspondence upon any phase of personal equipment. Careful consideration and a reply will be given in each case.

Respectfully,
JOHN SINKANSAS
Capt., U.S. Navy

Thanks very much for the information, Captain. We can also appreciate your views. We print a cross section of letters and Anymouses from the fleet—some we agree with, and some we don't, but all are printed with the objective of advancing facts and philosophy of aviation safety. We have, in the past, and still do, advocate that complaints be forwarded officially to the responsible Bureau—BUT, we also feel strongly that safety comes first, and when it is NOT possible or feasible for such an official report to be submitted, there must be some way for naval aviators to get the word to us. Hence, the Anymouse/Headmouse system. We feel that the advantages of the Anymouse system outweigh its drawbacks, as evidenced by other organizations adopting the program.—Headmouse.



COLD WEATHER COMMANDMENTS

1. Fill not thy tanks completely outdoors if thy machine is to be hangared, lest thy fuel expand and overflow, creating great tribulation unto the department of fire.

2. Prepare not for takeoff ere thou hast removed all ice, frost, slush and mud from thy wings, lest thee learn painfully how they destroy thy lift.

3. Guard thyself carefully against carbon monoxide fumes, which sneak up on thee unheralded and cause thee to fly most unprofessionally.

4. Save thy battery, for cold weather doth indeed reduce its poop.

5. Change thou periodically the pitch on thy reciprocator, lest it should become frozen ere thou pusheth it full forward on thy final.

6. Attempt not to judge the depth of snow from thy lofty perch, for snow is deceiving and thy faulty estimate may indeed cause the overworked ASO to be plagued with AARs and MORs.

7. Know thy oil dilution procedures, for hydraulicking and piston scuffing do verily consign thy set of jugs to the everlasting scrap heap.

8. Keep not thy cowl flaps closed when running up on the ground, for it is thy oil temp which thou art striving to increase, and not thy CHT.

9. Provide thou adequate cover for thy aircraft ere retiring to the Club, for 'tis far easier to remove a snow-covered canopy from thy windscreen than to remove the snow. And the morning duty section will sing thy praises around the line shack for thy foresight.

10. Plan thy taxiing well, keeping icy taxiways in thy mind, lest thou dash thy wheel against an obstruction light or wind up in the boondocks.

NOTES FROM YOUR FLIGHT SURGEON

NB-6 CHUTE USERS

ACCORDING to the Naval Parachute Unit at El Centro, discomfort and sore spots develop when the NB–6 chute is pulled too far down on the user's back. These difficulties can be eliminated by—

√ adjusting *chest* straps *before leg* straps

√ insuring that the D-ring hardware is properly positioned in the hollow of the shoulder

√ properly securing the cloth yoke on the back of the parachute to the riser hardware.

Inadvertent opening can be prevented by the fix detailed in ACSEB 21–57.

These suggestions apply only to the NB–6 back pack chute.

TOXIC TOLUENE

A HEALTH hazard was reported when a man, while wiping down an aircraft wing, became unconscious. It seems this lad had been using a cloth saturated with *toluene.* No respiratory protection was provided or used.

It is recommended that less toxic wiping-down solvents be used and that local exhaust ventilation be provided. Organic type respirators are also recommended for use during short exposures.—(*BuMed Occupational Health Hazards, Jan.-Mar. '57*)

Toxic solvents generally, are unauthorized for cleaning aircraft.—Ed.

LAP BEFORE SHOULDER

PILOTS, crews, and passengers should know the proper way of using seat restraining equipment. The most satisfactory procedure is as follows.

Tighten the lap belt before tightening the shoulder harness, or the lap belt will be pulled to a position higher than desirable, placing pressure on the abdominal organs rather than on the bony structure in case of crash. A lap belt positioned too high also may allow the wearer to "submarine"—slip down under the belt in a crash,—with subsequent incorrect positioning of the back and possible spinal injury, as well as the possible abdominal injury.

Once the wearer releases the lap belt at his destination, he will probably have to lengthen the shoulder straps in order to fit them back on the lap belt for the return flight. (Then he must remember to tighten the shoulder harness again.) If this procedure is not necessary, quite possibly it means that the shoulder straps were not tight enough for the original flight.

Note, this method applies to seat restraining harness only, not to parachute harness, which differs according to chute model.

NO SELF SERVICE

The following excerpt from OpNavInst 3740.7 is quoted for information:

"*Drugs:* Self-medication or the taking of medicines in any form by flying personnel without medical supervision is extremely hazardous. Even simple remedies which are obtainable, without prescription, such as aspirin, anti-histamines, cold tablets, cough mixtures, laxatives, tranquilizers and the like, may seriously impair the fine coordination and concentration required in flight."

A standard rule for flying personnel: "Take no pills or medicine unless prescribed or approved by the flight surgeon."

SNIFF

IN THE last half of 1956 CAA reported that there were 29 incidents of smoke or other atmospheric contaminants in scheduled air carriers. Of these 19 were from electrical equipment, and 8 from radio or electronic equipment. All but 5 occurred in flight, and 8 of the 29 led to unscheduled landings.

No one piece of equipment can be considered, as there were 19 different electric and electronic units listed as specific sources of the smoke or burning odors.

For more on this subject see "Cockpit Air Contamination," page 34: Ed

CAUSE BEHIND THE CAUSE

THIS "pilot-caused" HRS-3 crash and fire appears to be due to a number of factors including night operation in unfamiliar

terrain and general fatigue of the pilots living under field exercise conditions.

The investigating doctor recommended that under field problem condtions, commitments should not be so heavy as to require any pilot to fly more than 6 hours in any 24-hour period without having at least 8 consecutive duty-free hours for rest.

Visual difficulties led to his recommendation that an effective shield should be installed on HRS helicopters involved in night operations, so as not to render the copilot virtually blind.

It is satisfying to note again that the H-4 helmets provided complete protection against injury and burning of the parts covered. The outline of the helmet liner was plainly visible in the configuration of burns on the pilot's face.

The copilot had trimmed his gloves so they barely covered the heel of the hand. It is felt that had they been of the proper length the burns on the heel of his left hand, and both wrists, would have been much less extensive.

For both men, only parts unprotected by clothing (face, and gap between gloves and sleeves) were burned. Also the pilot burned one finger, where his glove had a hole.

TWENTY FATHOMS UNDER

THREE persons were in a HUP-2 when the engine failed 150 feet off the water. The plane captain escaped and surfaced in time to see the tail sink. The passenger came up, from about three feet he thinks, almost immediately afterwards.

As an estimated one or two minutes passed without sight of the pilot, the two survivors discussed diving for him.

Meanwhile the pilot had tried unsuccessfully to open the escape hatch. He felt the aircraft strike bottom. He tried to swim down to escape through the broken nose but he was too bouyant.

He then tried the hatch again and was able to work it open and escape. Lungs aching, he swam up slowly, without inflating his life jacket, for fear of surfacing too rapidly from what he knew was a considerable depth. When he reached the surface he inflated his jacket, and with the passenger and plane captain, was rescued by helicopter.

None had injuries except minor scratches.

The Coast Guard reported that the water depth at the site of the accident was *120 feet* (20 fathoms).

HOW I COLLAPSED THE PARACHUTE

"OF COURSE it all started earlier. I was testing a gadget on the F3H-2M when my chase pilot told me I had a fire. I started for the bay, when he told me the fire had disappeared. I decided to return to the field, but in the meantime, however, I had disconnected my oxygen hose and G-suit, removed my kneepad and cinched up my parachute harness.

"At about 6000 feet the chase plane reported a hole burned through the fuselage, and a part dropping off. Naturally I ejected.

"On ejection the seat *spiraled* upward and tumbled forward. The APH-5 helmet was lost by wind blast as the chin strap had not been cinched tight.

"After the chute opened I tried to slip into a sitting position in the harness to no avail. Therefore no straps were unfastened. I unfastened the right leg strap on contact with the water and my chest strap before attempting to come up for air.

"It was extremely difficult to get my head out of the water because the parachute had not collapsed and was pulling me at about 5 knots. This was most disconcerting! The strap would not slip off when my feet were turned toward the chute. By pulling myself toward the chute I could maneuver my body into a planing attitude.

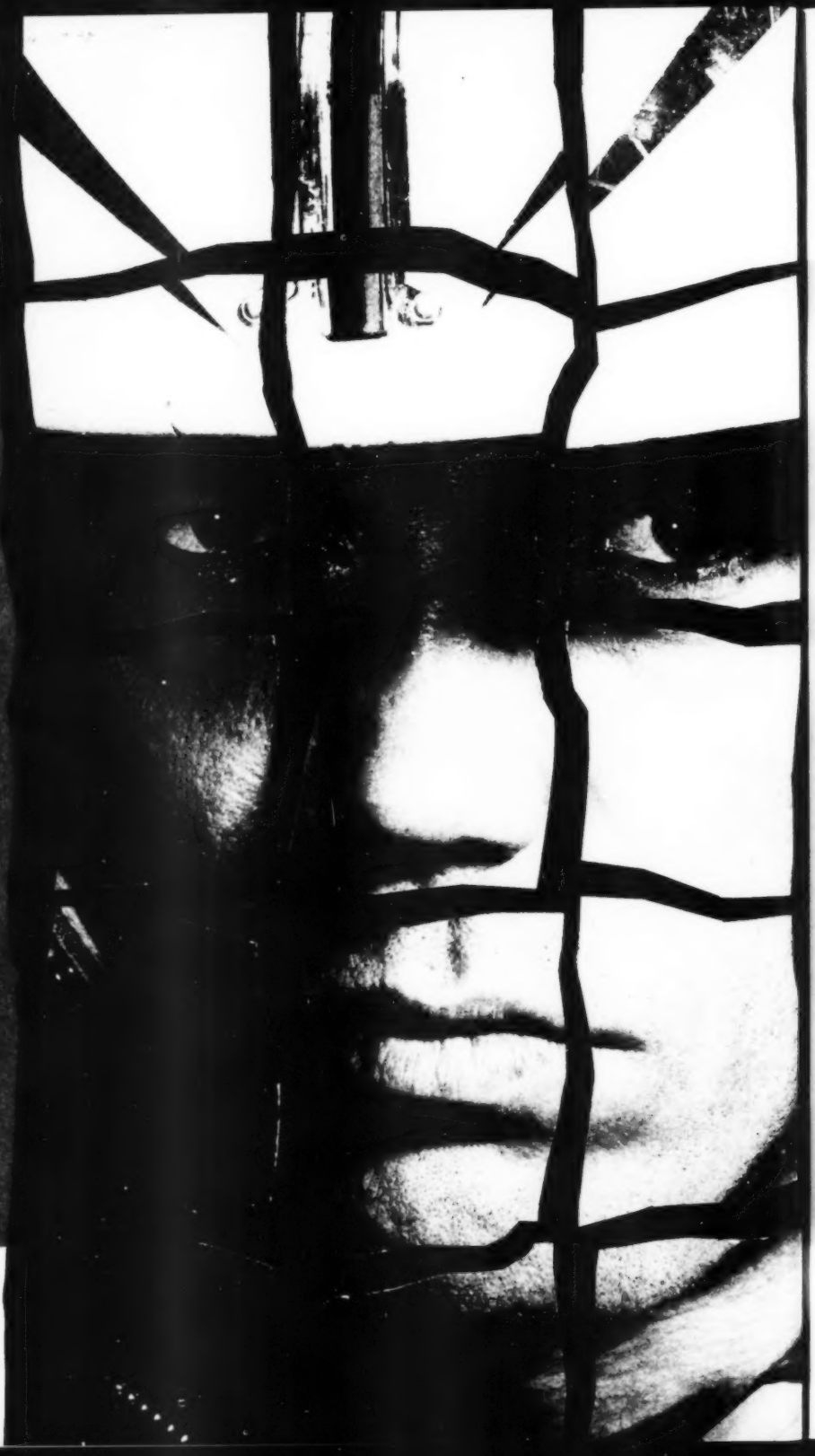
"When I relieved the tension on the strap with one hand I could unfasten the leg strap with the other. I released my grip on the harness but was immediately reminded that the lanyard was still connected between the mae west and the life raft which was now tangled in the harness. It was necessary to climb the lanyard to the harness, remove the strain and unfasten the clip.

"The helicopter pilot was most helpful, and almost succeeded in collapsing the chute with downwash from the leeward side. Clip unfastened, I climbed in the rescue sling, and was rescued.

F.S. Note — A fine, cool-headed and correct method of climbing to collapse the chute. However, inability to sit in the harness does not mean straps should remain fastened.

Best procedure is to get fully seated in the harness, then unfasten all straps shortly before contacting water, (unless wearing torso harness) keeping arms crossed on chest to retain harness until impact.

A QUESTION OF ATTITUDE



IT ALL began with the regular Friday evening airlift of the plane-load of weekend warriors from their city to the air station where they take their monthly training.

They arrived about 2000, stowed their gear, and congregated at the O-club for their customary bull session: hangar-flying, hi-balling, catching up on news of squadron mates for the last month, re-creating the team feeling. "The sessions break up when the last one leaves" and Weekend Warrior Wally left about 12:30 or 1 a.m.—0030 or 0100 regular types—and went to bed.

He woke up dull, as he expected, ate, and took off.

But the rest of the weekend didn't follow its regular and customary pattern. After some flying, Wally was to land and act as chase for the target tow plane. He landed, folded his wings to pass through the narrow taxiway. The tow plane had taken off, and Wally made haste to follow. He spread his wings while taxiing to the runway, checked his mags and took off. Three linemen noted his right wing was not down and locked, but were unsuccessful in stopping the takeoff.

The plane became airborne about five feet when the wing folded and the plane crashed in a nose-down right bank hitting the concrete runway on the right wing strut and engine. It bounced into the air, shearing off the engine, hit flat 20 feet farther on, slid 200 feet and burst into flames.

What caused this accident? "He forgot to lock his wing, obviously." Yes, but the basic cause is the lack of a professional attitude.

It appears that Wally hurried with his takeoff in order to catch up with the tow plane. In so doing it appears that he used insufficient judgment by failing to give sufficient weight to the requirement of actually going through the full checkoff procedure. He lowered his wings but failed to check wings DOWN and LOCKED.

It also appears that faulty judgment was exercised the night before. First, he knew he had a flight the next morning, yet he permitted himself to party late into the night; second, he failed to obtain a normal amount of sleep and rest; and third, he didn't feel well but still accepted the flight.

It may seem severe to categorize some all-to-common actions as immature and faulty judgment. This man did not have a bull session alone. He was only one of many who pursued approximately the same schedule. He happened to be the one who was tapped this time, and who provides our example.

But naval aviators must use the same approach to their demanding occupation as that used by professional athletes. This includes good physical conditioning, regular well-balanced meals, proper rest and habits, and continued study of the "game." The prize in the game of aviation is life.

This advice is even more important, if possible, to the weekend aviator than to the regular, because the part-time pilot runs a greater risk of unfamiliarity with his plane, to combine with any other hazards he may add through his own actions.

Hangar flying has a definite value, both in the actual first-hand information and experience exchanged and in the team feeling it generates which aids in formation flying, working and carrying out missions together.

It might also be recognized that bull sessions and camaraderie form some part of the at-

CONTINUED FROM PRECEDING PAGE

traction of being a weekend reserve.

However, an officer and an aviator is expected to exhibit a maturity of judgment and a correct sense of values which warns him how much is enough, and which will add up to the professional approach.

"So what if I lose a couple of hours of sleep."

"Aw, a few drinks won't hurt a thing."

"Boy, what a night I had—I don't feel so hot but I'll go anyhow."

Such comments do not add up to the professional approach.

All COs, safety officers, flight surgeons, and aviators should make the effort to overcome that laissez faire attitude towards the three effects of the night before which in combination so often lead to human failure in flight operations.

As a footnote; in this particular case although the fatal ingredients were all there, "the Reaper was thwarted only by the intervention of Lady Luck," to quote the accident report. The pilot escaped without severe injury. Hi-balls are not implicated —blood alcohol report indicated "probably not drinking." But fatigue is considered a factor.

Although such faulty judgment may be "all too common" it is also all too often the result of lack of understanding of the rules of human machine, rather than of a deliberate "who-cares" attitude. All good pilots have a mature attitude towards their profession.

There are other evidences of attitude—make your own list. You take good care of your equipment—you keep it clean and repaired and well-fitting, you have it with you, not back in the locker; you check out your passengers; you keep up with NOTAMs, you are alert to improvement suggestions which you send to the bureau where something can be done about it, rather than just telling your buddy; you observe weather minimums, and temper self-confidence with caution. You are a professional, well-trained and mature Naval Aviator. •

WHIZ QUIZ

SURE you can bring an expert into the booth with you for these, but there's no room for him in your airborne, pressurized isolation booth where the questions sometimes come fast. Instead of a bell or a razzer for a wrong answer you can often wind up with A—flameout, B—compressor stall, C—stall/spin, or D—you name it.

If you get 'em all right, try 'em on your wingman or copilot; if you didn't, better check the answer references.

1. In most jet engines, when you reduce RPM from 100% to 80%, your thrust is reduced to (a) 75% (b) 50% (c) 80% (d) 66%

2. The rule-of-thumb for determining angle of bank *vs increase* in stall speed, a bank of 75 degree increases stall speed approximately (a) 80% (b) 60% (c) 100% (d) 75%

3. The effective angle-of-attack of a compressor blade is a function of air velocity and _____.

4. In 40° F water without your poopy suit, your limit of life expectancy is about 2 hours, but it becomes marginal (50% chance of death) after only: (a) 1 hour (b) 15 min. (c) 30 min. (d) 90 min.

5. Maximum parasite drag occurs: (a) just before stall (b) max flight speed (c) $\frac{L}{D}$ max. (d) high angle of attack

6. The predominant cause of return of jet engines for overhaul is (a) overtemps (b) foreign objects (c) bearing failure (d) avgas

7. "Q" is: (a) static pressure (b) rate of acceleration (c) dynamic pressure

8. The upper limit of a jet engine's fuel schedule is designed to operate as near to a compressor stall as possible, in order to: (a) avoid flameout (b) improve acceleration (c) minimize adjustment (d) control combustion chamber temperature

9. When the visibility on a terminal forecast is *not* given, you know that it is better than: (a) 3 miles (b) 2 miles (c) 5 miles (d) 8 miles

10. The first group in this winds aloft sequence is for 30,000'; what is the wind at 40,000? 03595 58575 03625 00200

FOR ANSWERS SEE PAGE 36

"A LONE MAN'S COMPANION, A BACHELOR'S FRIEND, A HUNGRY MAN'S FOOD, A SAD MAN'S CORDIAL, A WAKEFUL MAN'S SLEEP, AND A CHILLY MAN'S FIRE."
— KINGSLEY

The Weed and YOU

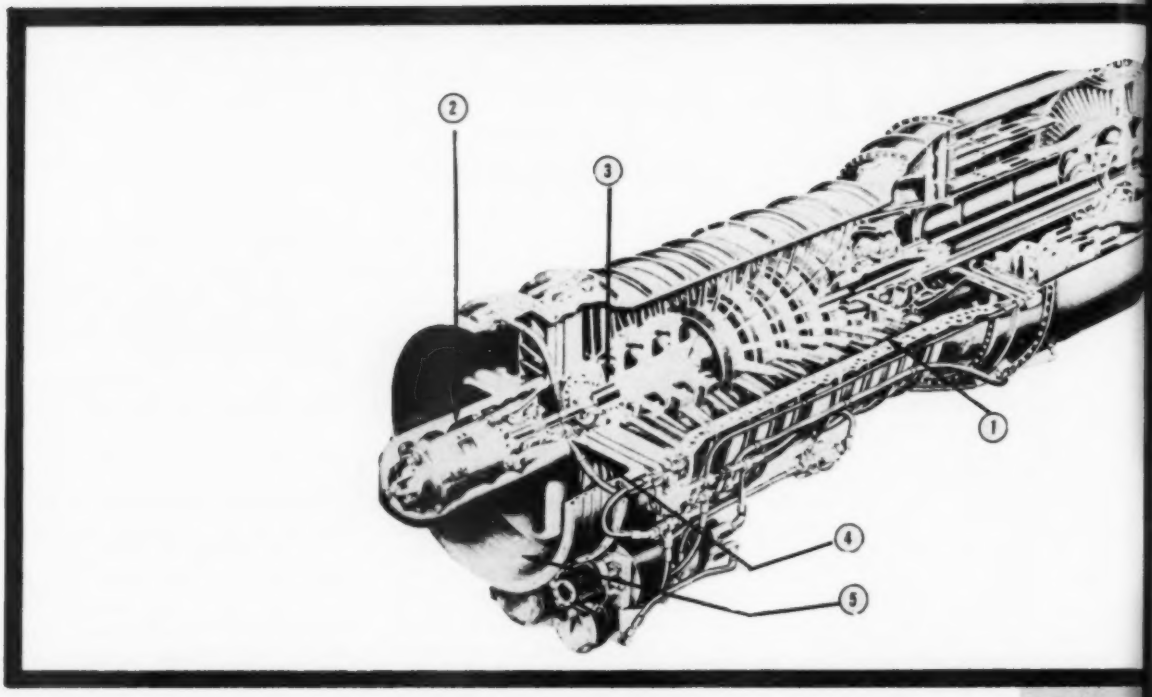
TOBACCO, next to caffeine, may be the most widely used drug in modern life. As such, it is natural that it has long been the subject of much controversy. To many pilots, a cigaret seems as necessary as an oxygen mask, or parachute harness. Of course, this is an exaggeration, but how near the truth it comes. How many of us, while flying above 10,000 feet will light up and "relax." Since it is done, let's examine some facts about this habit.

Tobacco smoke contains at least two poisons—nicotine and carbon monoxide. All pilots are aware of the effects of cockpit gases. Carbon monoxide rates as one of the deadliest gases known to man. Minute quantities produce visual disturbances, and decrease both visual acuity and night vision. This silent killer replaces oxygen in the blood. As much as 10 percent of the oxygen may be replaced by fairly continuous smoking of cigarets. The effects at altitude become increasingly more apparent.

Nicotine, the second of the two poisons is more insidious in its effects. Nicotine does not burn as was once thought. It is absorbed through the mucous membranes of the mouth and through the linings of the lungs. The smoke of each cigaret contains an average of 6.8 mgm. of nicotine of which 3 or 4 mgm. are absorbed from puffing. Nicotine causes an increase in metabolic activity requiring more oxygen—for normal activity. No one can smoke and wear an oxygen mask.

After *three* cigarets, it was found by direct experiments, that vision was adversely affected; as a matter of fact, on the ground, the effect was that of being at an 8000-foot altitude. At night this could have severe effects on one's safety. It was similarly noted that pilots who could ordinarily tolerate 20,000–21,000 feet altitude (in low pressure chambers) could only go to 16,000 feet during heavy smoking.

In conclusion, no one, not even cigaret manufacturers, claim beneficial effects from smoking. Available evidence seems to indicate that the effects of moderate smoking are probably not harmful to normal individuals. However, changes in altitude tolerances and visual acuity are of extreme importance to airmen. It would seem wise for airmen to avoid excessive use of tobacco in order to prolong their usefulness in flying careers and to maintain a high degree of flying fitness.—*MAG 11 SafBul* •



COCKPIT AIR CONTAMINATION CAUSED BY A JET ENGINE—A. The cockpit air conditioning system provides for the pressurization, heating and cooling of the cockpit. The air supply for this system is derived usually from between the 9th and 13th stages compressor item (1) thru compressor case outlet to the compressurization unit, located in the airframe.

B. Failure of a starter/or starter generator item (2) resulting in burning of electrical insulation, rubber, etc., smoke would pass thru compressor and be picked up at the cabin pressurization outlet, then into the pressurization unit and to cockpit.

C. Failure of number 1 bearing oil seal item (3) or failure of power take-off drive shaft seal item (4) would allow engine lubrication oil to enter compressor system sending oil fumes and oil mist into cockpit area.

D. Oil leaking from a crack in the oil cooler item (5) would allow oil to flow thru compressor to outlet then into pressurization unit and into the cockpit area.

There are aircraft now flying in which cockpit contamination can result from the malfunction of a single check valve, the *sniffle valve*, between the fuel pressurization system and the cabin pressurization system.

There are basically two types of cabin pressurization.

In one, the cockpit and other components such as radar and fuel transfer are pressurized by engine bleed air.

A better system, but one which adds a tremendous weight penalty, is one in which ambient air is pressurized for the cockpit, by an independent compressor.

Aircraft with the *sniffle valve* are the F2H, AJ, TV and A3D. However, contamination is also possible in other models, therefore the hazard should be understood by all aviators and flight crews as well as those who may aid crashed aircraft and those who handle fuels, cleaners, hydraulic fluid and fire extinguisher chemicals.

And if you're flying a single-place aircraft you're much more vulnerable to cockpit contamina-

Cockpit Air Contamination

A recent safety-of-flight dispatch noted: "Several suspected jet aircraft accidents and recent fatal accident positively resulting from toxic fumes indicate the desirability of operating all jet aircraft on one hundred percent oxygen at all times. If aircraft endurance exceeds oxygen supply, recommend 100 percent oxygen on takeoff, landing, and under any unusual or emergency flight conditions."

tion than the man flying with copilot and crew, for in a group some persons can be affected severely and obviously while others are still able to take remedial action. Then too, at high altitudes where your air contains less oxygen the toxic effect of any inhaled contaminant is accentuated because of the relative increase in the ratio of the contaminant over the available oxygen in the air.

While much attention has been given to carbon monoxide poisoning in the recent past, CO is by no means the only hazard to guard against; there are other toxic agents which are equally as dangerous—vapors of fuel, hydraulic fluid, coolant fluid, and fire extinguisher chemicals.

Gasoline vapors are heavier than air and are readily absorbed by the lungs. They are poisonous in concentrations *far lower* than that required to cause fire or explosion. If the concentration is high, symptoms may appear after only a few minutes of exposure. Slight exposure causes dizziness, nausea, and headache. *These in fact are the primary symptoms for most of the inhaled poisons discussed here.*

Acute poisoning is marked by burning, watering eyes, restlessness, excitement, disorientation; disorders of speech, vision, and hearing; and in excess, convulsions, coma and death.

Reported Incidents — A nonfatal case of *sniffle valve* failure occurred in a jet trainer. Fuel leaked into the plenum chamber and fumes were carried into the cockpit by the pressurization system. The pilot experienced symptoms similar to those caused by hypoxia or alcoholic intoxication but was able to land his plane before losing consciousness.

In another case an A4D pilot radioed that he had a fire. He apparently made no attempt to eject, but planned to make a flameout landing on the flat desert. Post mortem examination showed that he had inhaled toxic fumes which probably accounted for his unsuccessful landing and death. Inhaling toxic fumes is an ever present possibility in today's jet combat aircraft.

In one commercial airline accident it was determined that the 25 passengers who remained in the aircraft died from exposure to gasoline vapor, possibly within 5 minutes. The evaporation of 28 gallons of gasoline would result in a vapor concentration of 20 percent which would be lethal in a few minutes.

CONTINUED FROM PRECEDING PAGE

This hazard may be present along with the fire and explosion hazard, at any aircraft accident where tanks are ruptured.

Hydraulic Fluid, Oils, too—When oil escapes onto hot engine parts, and its fumes enter the cockpit, the pilot may experience symptoms similar to carbon monoxide poisoning, including headache, nausea, and sometimes vomiting, in addition to irritation of the eyes, nose and throat.

Hydraulic fluid is in the same chemical family as engine oil. A small leak from a hydraulic pipe or gage under pressure may release a finely divided spray of hydraulic fluid which diffuses quickly throughout the cockpit. Some of the chemicals in hydraulic fluid are toxic when inhaled. The octyl and propyl alcohols, for example, are about 12 times as potent a narcotic as ethyl alcohol (the drinking kind). They also irritate the eyes and lungs, cause headache and vertigo and actual impairment of judgment and vision.

Experimental animals have been killed in a few hours by exposure to air containing 3 mg per liter of hydraulic fluid. And that's not much—about the same as 1/100 of a standard-size aspirin in a quart.

Fire Extinguishers and CO_2—Fire extinguishers can be lethal under certain circumstances. Within the aircraft itself there is the possibility of over-concentration of CO_2 (carbon dioxide) from discharging a portable fire extinguisher, even the little two-pound trigger model. If your fire is in clothing or upholstery, it might be wise to consider using your precious jug of coffee on it in a small cabin like a Beechcraft's—don't do this on electrical or flammable-liquid fires though! A carbon-tetrachloride extinguisher can produce toxic vapors when the carbon tet is vaporized by the fire you're trying to extinguish.

And your friendly life raft can release plenty of CO_2 if it's accidentally or intentionally punctured after becoming inflated in the plane. Better let it crowd you until you're safely landed, if you can. Your Mk II life jacket doesn't contain enough CO_2 to be dangerous, though. An excess of carbon dioxide will first cause labored breathing followed by excitement, headache, vertigo, indigestion, drowsiness, weakness and dizziness. Higher concentration will result in coma and death.

The fire extinguishing systems installed for the protection of engines, heaters and cargo spaces can also leak serious trouble into the occupied portions of the airplane. In addition to CO_2, several other extinguishing chemicals are in use and they vary widely in their toxicity. Methyl bromide, a highly toxic agent, was used on the *Mars*, is no longer used in the Navy but is found in some Canadian aircraft. (At one time small extinguishers containing methyl bromide were sold for auto and home use—they put out fires, but they also killed people.)

The Navy and commercial air carriers now use $CBrF_3$, whose trade name is "Freon 13B1" and which is claimed to be non-toxic and non-corrosive. However, crash crews, for example, may be interested in knowing that USAF aircraft use bromochloromethane, commonly called "CB" in the industry, which is not as toxic as methyl bromide but is still capable of putting you down for the count. Symptoms of methyl bromide poisoning, which causes swelling within the lungs, are headache, vertigo, nausea or vomiting, followed soon by coughing, frothing, rapid swallowing, rapid breathing and fever. Large or prolonged doses will result in coma and death.

For your protection, some manufacturers include a chemical in the pressurized methyl bromide containers which gives off a horse-like odor. Wintergreen is also a warning odor—it's been used in CO_2 fire extinguishing systems.

The general and specific rule of safety in any case where inhalation of toxic fumes is experienced or even suspected, is summed up in one word—OXYGEN—one hundred percent..... get on it. Use it. It's your only remaining source of uncontaminated breathing.

- SO -

"If you want to live to be an old foxia
Gotta know the symptoms of hypoxia.
And fatal fumes which don't have essence
To warn you of their deadly presence.
If you're in doubt, or smell a scent
Breathe oxygen, one hundred percent!"

ANSWERS TO

WHIZ QUIZ

PAGE 32

1. (b)—"Flyboy," pg. 4
2. (c)—"Flyboy," pg. 41
3. Compressor RPM, APPROACH, Nov., pg. 12
4. (c)—APPROACH, Nov., back cover
5. (b)—"Flyboy," pg. 20
6. (b)—APPROACH, Dec., pg. 28
7. (c)—APPROACH, Jan., pg. 6
8. (b)—APPROACH, Nov., pg. 12
9. (d)—WBAN Circular "N"
10. 360°, 225 knots

THAT *ELUSIVE* COTTER PIN

PERHAPS no single item of equal size used on today's aircraft has a more important role than the cotter pin.

It is used extensively throughout the construction and assembly of the aircraft, but its most significant role is to join and *hold* securely aircraft's *control systems.*

Consequently the improper installation of, or the failure to install a cotter pin at all, usually results in the loss of control of the aircraft, sometimes culminating in a serious accident. The selection of the combination of castellated nut and cotterpin as a fastener from the large family of fasteners in aircraft usage is determined by a number of factors; the relative motion of assembled parts, heat, vibration, chemical action and stresses to which it may be subjected.

Experts say that for certain assemblies the cotter pin is unexcelled in ensuring a positive lock. A quick examination of the cotter pin-castle nut-bolt assembly suggests why. When the cotter pin is inserted through the keyways of a nut and bolt it passes through the common axis of both. The forces required to separate the nut and bolt are immeasurably greater than those that are ever exerted during normal operation. This feature of security is the cotter pin's greatest asset and accounts for its long time use on aircraft.

But not all is ideal with the cotter pin.

Because of its small size, it is sometimes omitted during assembly, maintenance or repair of aircraft. Further, this feature helps it escape the scrutiny of mechanics.

How much greater a price must be paid before the full significance of these errors and resulting consequences brings about a sincere searching of the soul and resolutions that will generate a new sense of thoroughness?

Testimonials reflecting the importance of the role of the cotter pin are contained in the many reports of accidents, forced landings, incidents and fatalities which were the direct result of the failure to use the cotter pin when and where it was required.

Here is a case typical of several in the files of NASC which show that practically all models of aircraft are vulnerable and that the elusive cotter pin can escape all but the most conscientious mechanic and inspector.

A TV-2 pilot made a forced landing when the throttle linkage and fuel control became disconnected. The fuel control went to the IDLE position. The cotter key was missing. The most probable cause—the cotter key had not been replaced during maintenance six flight hours before the accident.

Cotter pin usage has declined through the years. The blame too often has been placed unjustly on the cotter pin. In nearly all cases the mechanic and/or inspector is at fault.

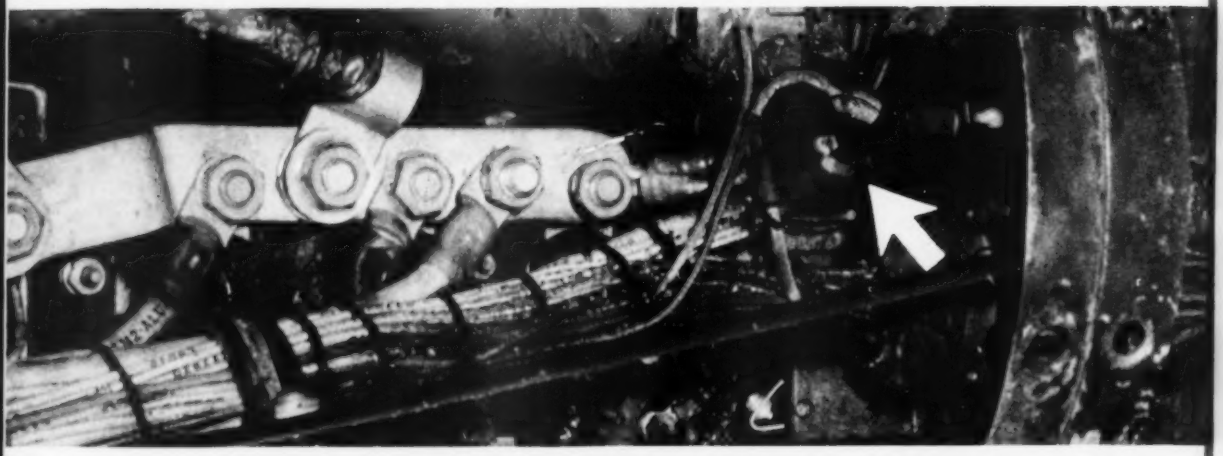
As aircraft mechanics we must face up to this shameful situation of forgetting to lock things in place. It's time we redeem the reputation of the cotter pin and regain the confidence of our flight personnel by becoming the master of aircraft equipment, especially of that small elusive cotter pin.

Make a point to complete each job separately before starting another. If this rule is followed you may avoid forgetting to drop the cotter pin through bolt and nut and say—**bend the ends over, it will keep it there forever.**

Captain R. L. Gallant, USMC
Maint. & Material Analyst, NASC

FROM THE GROUND UP

SELECTED FORCED LANDINGS, GROUND ACCIDENTS, NOTES AND COMMENTS ON AIRCRAFT MAINTENANCE.



Circled area shows position of ⅜" wrench that caused ignition of fuel vapor.

SHORT CIRCUIT — A mechanic was isolating a fuel leak at the fuel vent disconnect line of FJ-4. While in the process of removing attaching bolts which secure the disconnect line to the bulkhead fitting he dropped a ⅜" open-end wrench which caused a short circuit and ignition of fuel vapor and fuel lying in engine compressor housing.

The wrench came in contact with the battery relay circuit breaker and created a short circuit which grounded through the armored covering of the fuel quantity co-axial cable. The resulting spark ignited fuel vapors created by the fuel leak and fuel which had drained on the engine compressor housing. Major damage to the aft fuselage resulted.

FJ-3 OIL CAPS—Recently an engine failure occurred during the landing rollout of an FJ-3 after a flight of 2.3 hours duration.

Upon investigation the pre-oil cap (Part No R45C47) for the center main bearing was missing. Prior to flight the cap had been cinched down with a wrench after pre-oiling.

Examination of a second aircraft which had just returned from flight revealed a loose center main bearing pre-oil cap.

Plane captains reported several other instances of planes returning with finger-tight caps which were previously cinched down.

Recommended interim fix: (1) Safety-wire caps by drilling hole in plunger of nut Part No. R45C47, wrap wire through hole around nut and connecting tee or (2) Replace above nut with nut Part No. R45C-88400 and safety-wire.

CONTRACT REFUELER DRIVER QUALIFICATIONS—Investigation of the qualifications of a contract refueler driver following a collision of a fueler with an FJ-3 brought out the following facts.

This was his first day as a driver.

His training for the job consisted of accompanying an experienced driver for one day to learn refueling procedures.

He had never been given a formal briefing on safety instructions pertaining to the refueling operation.

He was not aware of local regulations prohibiting the traversing of a line of aircraft with refueling vehicle.

Corrective action within the squadron consisted of instructing line personnel to be alert to assist

the refueler driver where possible, and to stop any vehicle that is violating safety regulations. It was also recommended that a copy of the refueling instructions be placed in each refueling vehicle and that the drivers be required to demonstrate a thorough knowledge of these instructions before being permitted to drive a refueling or oil truck.

In this case the local representative of the contractor

(1) has taken steps to post operating and safety instructions in each vehicle;

(2) agreed that each driver will obtain a Navy Operator's License for the operation of a refueler truck;

(3) was furnished all pertinent instructions, technical orders and technical notes.

CRADLE TROUBLES—Following removal from an F9F-6 the tail section rotated backward in the cradle and struck the deck causing considerable damage to cradle as well as the tail section. The rotation commenced when two of the maintenance crew stepped down from the forward part of the tail section where they had been standing during removal of the after section from the aircraft. The forward attachment device failed to hold the tail section in place because it had not been installed properly.

Improper supervision of the maintenance crew was responsible for the forward attachment device not being properly secured to the cradle. The Mating Cradle was not properly positioned under the aft section. It was located approximately two inches behind the correct position. This prevented the forward attachment device from being installed properly. Only part of one thread was holding the bolt in place.

In another case . . . the night check-crew removed the after fuselage section from an F9F-8B, and placed it on a cradle in preparation for routine check. The cradle was being pushed into position to be reinstalled when the assembly slipped aft in the cradle and rocked downward coming to rest on the bottom of the rudder. The bottom of rudder was crushed.

Supervisory personnel had failed to insure that the assembly was properly secured in cradle upon removal from aircraft and prior to moving the cradle into position for reinstallation. The keel disconnect fitting, Part No. 137623-6, located at station 299 was not engaged by the safety lock on the cradle and the friction knob was not tightened.

The reporting activity notes that maintenance personnel have been re-instructed to make a positive check that the after fuselage section is properly secured in the cradle upon removal and prior to moving the cradle. This inspection item is to be incorporated in the check sheets.

COSTLY GROUND ACCIDENTS—FLIGA reports indicate an unacceptable trend in both the number and the cost of preventable occurrences in hangars, on parking ramps, flight decks and practically any place where vehicles come in close proximity to aircraft. Ground accidents account for 25 percent of the FLIGA reports, *but* they represent 75 percent of the FLIGA dollar losses!

There were 303 reported ground accidents between 1 July and 31 December 1956. The cost—a staggering $10,802,289.

From 1 January through 30 June 1957, 406 ground accidents were reported . . . and the cost—$4,070,979.

During one fiscal year the equivalent of a whole fighter squadron—(15 planes) received strike damage, 28 planes went to overhaul and another 145 received substantial damage.

July and August of 1957 brought in another 135 reports that have a price tag of $1,507,410. Unless all commanding officers, and all officers and men of each command implement corrective measures, and if the trend continues through the next four months, the number of ground accidents will reach a new high mark!

The largest single category of ground accidents during fiscal year 1957 involved aircraft/vehicle collisions. A review of SOP concerning operations of vehicles in the vicinity of planes and a re-evaluation of qualifications of all persons who drive government vehicles, including NC-5s, tractors, mules, forklifts and trucks appears to be very much in order.

THOSE O-RINGS—O-rings are small but mighty important to the functional integrity of hydraulic and other pressure systems on aircraft. But consider this . . . unless the material used in the O-ring resists the chemical action of the particular fluid with which it will be used, it may deteriorate and render the O-ring useless. Also, inasmuch as the O-rings look alike, it is easy for a mechanic to install the wrong O-ring, one incapable of resisting the chemical action of the particular fluid to be used. In short, the right fluid but the wrong O-ring for that fluid.

There *is* a solution, however: Color code the O-rings so that a particular color is used for a particular fluid.—*FSF Bul 57-15*

FIRE AND SMOKE IN AD COCKPIT—An AD-5N landed with the following pilot's discrepancy; "electrical fire and smoke in cockpit, someplace

CONTINUED FROM PRECEDING PAGE

behind the instrument panel, burns even with battery-gen switch in OFF position."

The following action was taken:

1. Aircraft was thoroughly inspected and no evidence of burned wires or fire was found.

2. An accumulation of oil and grease was found in the heater line. This was cleaned out. No smoke or fire was detected during engine turn-up.

3. The aircraft was test flown and immediately upon takeoff the cockpit again filled with smoke. The only evident malfunction noticed was that the turn and bank indicator was inoperative.

4. After landing the aircraft was again thoroughly inspected and upon removing the vacuum pump lines it was discovered that they were full of oil.

5. Further investigation revealed that the vacuum pump drive shaft was sheared which allowed engine oil to accumulate in the lines. It is believed that these lines became full of oil and the heat from the engine, especially on takeoff, caused the oil to start expanding and resulting smoke to be emitted through the filter of the turn-and-bank indicator in the cockpit.

6. The system is illustrated in Figure 4-5 page 203 of an 01-40 ALEB-2.

7. Cleaning the lines, replacing the vacuum pump and the instrument corrected the situation.

R-3350 OIL SCREEN INSTALLATION—"Extreme caution must be exercised when installing the main oil screen in the rear sump of the R-3350 engine, since the sump is magnesium, and the threaded portion of the screen cover is steel. To further complicate the situation, the whole assembly is installed under a spring load, making cross-threading easy unless great care is taken to avoid it.

"A future modification will correct this weak point, but until then, we must make the best of the situation and learn to live with it. *Be careful.*"

R-3350 Cylinder Change Caution—"The power cases on engines we have operated in the past have all been aluminum; not so the R-3350—it is steel.

"As you know, the link rods of a radial engine are highly stressed; very little damage will cause total failure, resulting in a wrapped-up engine, good for scrap only. A nick caused by the rod falling against the case when the cylinder is removed is sufficient damage to bring on the above condition, and since the going rate for new R-3350 engines runs around $86,500 it behooves all concerned to exercise extreme caution when changing cylinders.

"If the rod *is* accidentally nicked as described above, DO NOT hide the fact; let your supervisor know. *Engines have failed due to this condition during the second takeoff run.*

. . . Make a plate to hold the rod in position *after* the cylinder is removed . . . the rod is still vulnerable until this part is installed, so again—BE CAREFUL."—*Excerpts from the "FSF Mechanics Bulletin."*

AIR LOCK — Following a 180-hour check of an S2F the power plants crew leader was assigned to ground turnup. The port engine was started first and there was no indication of oil pressure. The main inverter circuit breaker was checked IN and the engine was secured after running approximately 30 seconds. The port engine had seized. Prior to the attempted start of the engine, the oil quantity was checked and observed to contain 11 gallons.

The engine seizure was probably due to an air lock in the oil inlet to the pump. Malfunction of oil inlet check valve due to lack of prime in the oil pump is also considered a possibility.

It is recommended that after routine checks, and the aircraft has been re-oiled, each engine's oil pump check valve be pulled and the prop turned through until all air is expelled and a free flow of oil is seen.

SUCKED IN—After an FCLP flight an F2H was returned to the flight line for shutdown. According to squadron operating procedure, an NC-5 external power source was plugged in and the engines were advanced to approximately 70% prior to shutdown. During this turn-up, a lineman who was crouched under the starboard engine nacelle after having plugged in the external power cable, raised up directly in the high suction area of the starboard engine and was sucked into the intake and against the faired duct door.

Removal and inspection of the engine was required. Several compressor blades were nicked when articles from the lineman's pockets passed through the engine.

The lineman suffered "C" injury. •

If An Aircraft Part Can Be Installed Incorrectly, Someone Will Install It That Way.

MURPHY'S LAW*

SHORTLY after starting the engine of an F9F-8T the altimeter in the front cockpit burst, throwing glass fragments into the mechanic's face and chest.

Murphy's Law had been applied again—examination showed the flapperette hydraulic line connected to the static vent line at fuselage station 284. Normally when the tail of the F9F-8T is removed, the static vent line is disconnected at station 284 and the flapperette hydraulic line is disconnected at the quick-disconnect located just forward of station 284.

In this case, the two lines were disconnected at the same station. This left two fittings of the same size and number adjacent, and even though both fittings were properly marked with the correct color code, the setting for Murphy's Law to be enacted was present.

The reporting unit took the following steps to prevent a recurrence.

a. Further impress maintenance personnel on the importance of the color code marking system. *The mere fact that two connections will mate does not necessarily mean that they belong.*

b. Restate the policy of breaking the flapperette hydraulic line at the quick-disconnect instead of at the fitting at fuselage station 284.

Wrongly connected lines show how similar connections at same station makes perfect setup for Murphy's Law.

ONCE UPON A TIME ...

by R. W. MILLS, ADC
VAP-61's "Graphic View"

. . . there was a very tiny bolt (not as tiny in comparison to the minute bolts used in very tiny instruments, but definitely tiny by comparison to the bolts used around itself.)

This little bolt was only ¼-inch in diameter and one inch long, while most of the bolts around it were much bigger around and far longer. This made the little bolt feel insignificant and quite useless. It didn't add to the tiny bolt's pride a bit, to know that it was only seldom, if ever that someone looked at it to see if it was doing its job properly. In fact, the tiny bolt felt lucky if someone bothered to check it as often as every sixty hours or so. Everytime the tiny bolt would see a human touching, tightening, or checking the bigger bolts around him, his pride was so wounded that he wished there was some way he could show his worth and make everyone sorry that they didn't pay more attention to him.

The tiny bolt vowed that someday, some way, he would "show them all" . . . and the only thing that held him back was his friend, a stop nut, that kept a firm grip upon tiny bolt and wouldn't let him do anything foolish or rash. Try as he may, though, tiny bolt couldn't convince the stop nut that the two should work in "cahoots" and throw a monkey wrench into the works. (You see, stop nut was well adjusted and in spite of his small size, he realized his worth in the scheme of things.)

One day (and a sad day it was for tiny bolt) some human came along and transferred stop nut. He took stop nut away from tiny bolt and placed him in a tool box on top of a work stand. Now this human had no intention of keeping stop nut away from his friend tiny bolt for any length of time . . . just long enough to remove an item that stop nut was standing in the way of. When the human walked away and left stop nut all by himself in the toolbox, stop nut yelled as loud as his little voice would allow, but to no avail . . . for the human was thinking of a cup of coffee and a cigarette . . . not about the fact that he had removed tiny bolt's only friend. The human didn't realize that stop nut was the only one really close enough to tiny bolt to keep him in line—and keep him from taking the first chance to show his importance by running away from his job.

Old "human" completely forgot about "stop nut" . . . he looked at stop nut many times, lying there in the tool box, but never once did it dawn upon human that stop nut had been removed from his natural habitat. Now tiny bolt had just the opportunity he had longed for . . . a chance to show the bigger bolts that in spite of their size and popularity among humans, he (tiny bolt . . . the tiniest bolt of them all), was of some importance too.

Tiny bolt waited for just the right situation to come along, where his absence would really make the humans and the larger bolts take notice. He went along with the program for several days, just as if he were perfectly happy to do his job without his friend stop nut around. Then one day he heard human bragging about what a good job he always did and he heard other humans swallowing the story whole-heartedly. Now, said tiny bolt, now is the time . . . I'll not only show the big bolts, but I'll make a monkey out of this smug human at the same time. Tiny bolt waited; he felt himself tugged and pulled upon, he felt his body tremble from the vibrations applied upon him, he felt his head start to whirl as he left the ground . . . he knew instinctively that this was his big moment . . . he twisted, turned, and strained . . . and without too much real effort on his part, he jumped right out of the fitting he was supposed to be holding down. Down and down he fell . . . landing in a big pool of oil inside a piece of engine cowling . . . he lay there quite still . . . waiting for the inevitable.

Human sensed something wrong . . . he couldn't control the straining monster that was pulling him through the air . . . the monster lurched forward and started running wild . . . human was doomed. The monster pulled him down to the ground at too great a speed and human, monster, and tiny bolt all perished in the resulting crash.

Naturally stop nut attended the funeral of his friend tiny bolt—and as he left the chapel he was heard to say, "If I could only have been there with poor tiny bolt to hold him back . . . he was lost without me."

WHEELS-UP SAVES

WHEEL WATCH	STATION	AIRCRAFT	DATE
MASLONKA, G. R., AN	NAS MOFFETT	FJ-3	26 Aug
LANE, E. A., AC1	NAS ATSUGI	F9F	23 Aug
JOYNT, R. P., AC1	NAAS KINGSVILLE	F9F5	na
CONDIE, D. L., AB2 MOORE, J. V., AB3	NAAS CABANISS	T-28 & 2 AD	10 Sept
McGUIRE, E. L., AB3	NAAS CABANISS	AD	4 Sept
1/Lt H. L. BURGE 1/Lt R. J. QUAIN	MCAS CHERRY PT	AD5	29 Aug
*McEVOY, F. D., AC2 LAUSMAN, R. L., AMHAN	NAAS MAYPORT	F9F-8	11 Sept
RIDDLE, R. E., MM3	NALF CROWS LDG	AD	1 Aug
CONWAY, A. R., AC3	NALF CROWS LDG	AD	12 Aug
*CONWAY, A. R., AC3	NALF CROWS LDG	AD	26 Aug
WHITING, R. L., AC3	NAS CECIL	F8U	na
O'QUINN, P. E., AC3	NAAS CABANISS	AD	11 Sept
WILLIAMSON, R. P., ADJ3	NAS MIRAMAR	F9F6	6 Sept
McCURNIN, C. J., ACC	NAS MIRAMAR	AD	17 Sept
WILSON, E. D., AC2 GISONDI, W. A., AC3	NAS MIRAMAR	AD	13 Sept
TALAASEN, B. E., AD2 HINGST, B.D., AO2	NAS MOFFETT	F9F	12 Sept
†KOTHE, O., AC2 LYNCH, E. F., SN	NAS NEW YORK	F9F6	28 July
WELLS, W. P., AB2 DAVIS, M., AA ROBERTS, R. M., AC3	NAS ATL CITY	SNB	26 Sept
MINTER, C. W., AC2	NAAS KINGSVILLE	F9F	na
§ENBORG, P. J., Jr., AC3	NAAS CABANISS	AD	5 Oct
BLACOW, E. W., AC3	NAS MOFFETT	AD6	2 Oct
LT V. G MOTTARELLA SEPPALA, R. C., AC2	NAS SO WEYMOUTH	F9F6	18 Sept
PORTER, W. J.,ACCA	MAS MIRAMAR	F3H	3 Oct
LEONARD, R. C., AC3	NAAS KINGSVILLE	F9F5	na
GIRTY, W. C., PFC	NAAS EDENTON	AD	24 Oct
WATTERS, J. A. Jr., AO2	VA-55	F9F	30 Oct
HANSEN, P. R., AC3	NAS MOFFETT	R7V	18 Oct
STEVENS, L. M, TSGT	MCAS MIAMI	F9F6	14 Oct
WYLIE, R. M., AC2	NAF MONTEREY	T28	na
McVEIGH, H. T. J., AC3	NAS ALAMEDA	FJ-2	26 Sept
MAJ. R. D. SHIPMAN	VMF217	F2H	21 Aug

* second save
§ fourth save
† fifth save

ALAS THE RUNDLES

From the halls of Aviation Safety
To the shores of Laguna Beach
Comes the tale of a Marine Corps Captain
And the lesson he can teach
Now this Captain is a famous man
Who's the terror of the sky
From Able Dogs to Fox Four D's
T'aint nothing he can't fly
His GCA approaches
Are beautiful to see
While his Close Air Support Missions
Have all made history
But then while at Mojave
On a mission in the night
There came the fire warning
Shining clear and bright
But the Captain didn't panic
He was nobody's fool
Even on his "waveoff"
He still was calm and cool
So back into the final
Came our Captain with a roar
His landing was no worry
He'd made them all before
He lined his bird up nicely
He'd made it with no sweat
But he kept settling, settling, settling
"Why haven't I touched down yet! ! !"
The noise and sparks on landing
Were something to behold
But the Captain didn't enjoy them
In fact they left him cold
Sitting in his cockpit
He wished the Corps was stocked
With nothing but Spads and Fokkers
With gear *FIXED*—down-and-locked
So if you see a pilot
Drinking Stingers in the rough
Take pity and buy him another
He's had it sort of tough.

—Richard R. Arndt, SSgt. USMC

Forwarded by Major C. H. Coppedge, Safety Officer, MAG 33

WHEELS-UP LANDINGS
BOX SCORE

MAJOR WHEELS-UP LANDINGS (PILOT-CAUSED):

1956	1 JAN — 17 NOV	56
1957	1 JAN — 17 NOV	**27**

TIP TANK

MISCELLANEOUS AVIATION SAFETY TIPS . . .

TO MISS A MOUNTAIN

FOLLOWING a recent C-47 accident, several inquiries were made of various pilots concerning terrain clearance provided by airways minimum en route altitudes.

The aircraft was flying (presumably) at its assigned 10,000-foot altitude when it ran into a 10,000-foot mountain 15 miles off course. Of the 10 or 12 pilots queried, only 2 actually knew that the minimum altitude specified on airways gives terrain clearance only within the width of the airway. Most felt that in mountainous terrain, the minimum terrain clearance was provided 10 to 25 miles to either side of the center line of the airway.

An additional note of interest in this accident—the estimated in-flight temperature was —20° C. With an indicated altitude of 10,000 feet, such a temperature results in a true altitude of 9400 feet. The aircraft was located at the 9100-foot level on the mountain. The radio navigational aids, in this case low frequency non-directional homers, were 158 miles apart. Wind was estimated at 40-45 knots, bearing 290 degrees, while the magnetic course was 242 degrees. The aircraft was located on a bearing of 225 degrees from point of departure indicating that it had gone left of the intended course.

While the misconception of terrain clearance may not have contributed to this accident, the number of people who had such a misconception may be indicative of a general misunderstanding throughout the Air Force. While the information is available in the Radio Facilities Chart, it is obvious that many of us do not read it.—USAF "Flight Safety Officers' Bulletin."

GENERAL NOTES ON JETS

THESE ACCIDENTS were caused by stalls developing during flight involving radical maneuvering. Whereas older propeller fighter aircraft seldom proved very difficult to recover from inadvertent stalls during similar maneuvers, the newer jets with their radically different aerodynamic characteristics, require more attention if they are to be successfully fought in combat tactics.

Pilots must first of all know the accepted recovery techniques; second, they must use control trimming devices correctly; and third they must avoid radical maneuvers until they have thoroughly tested the handling features and have learned the aerodynamic limits to which they can put their aircraft.—*Nav AirPac Notice*

HIT PLEXIGLAS HARD!

CONVAIR CONDUCTED tests to determine what it takes to break the canopy of a jet aircraft. It was found that one of the best tools was an 8 pound sledge hammer. The important lesson learned during the tests was that it is essential to hit Plexiglas hard, and to hit it as near the edge of the frame as possible. Outside of crash crews, not everyone carries a sledge hammer in his hip pocket. But a full 5-gallon water can and even a professional movie camera have been used successfully in this operation. Whatever you may hit with, hit near the frame and hit hard!

FOREST FIRES

OTIG reports that recent tests have conclusively proven that lighted cigarets and cigars thrown from aircraft in flight can cause forest fires.—*ARDC "Newsletter"*

There's a limit to how far a checklist can go, but it looks like MARS 17 has a pretty good idea tacked on the access door to their hangar.

Well done....

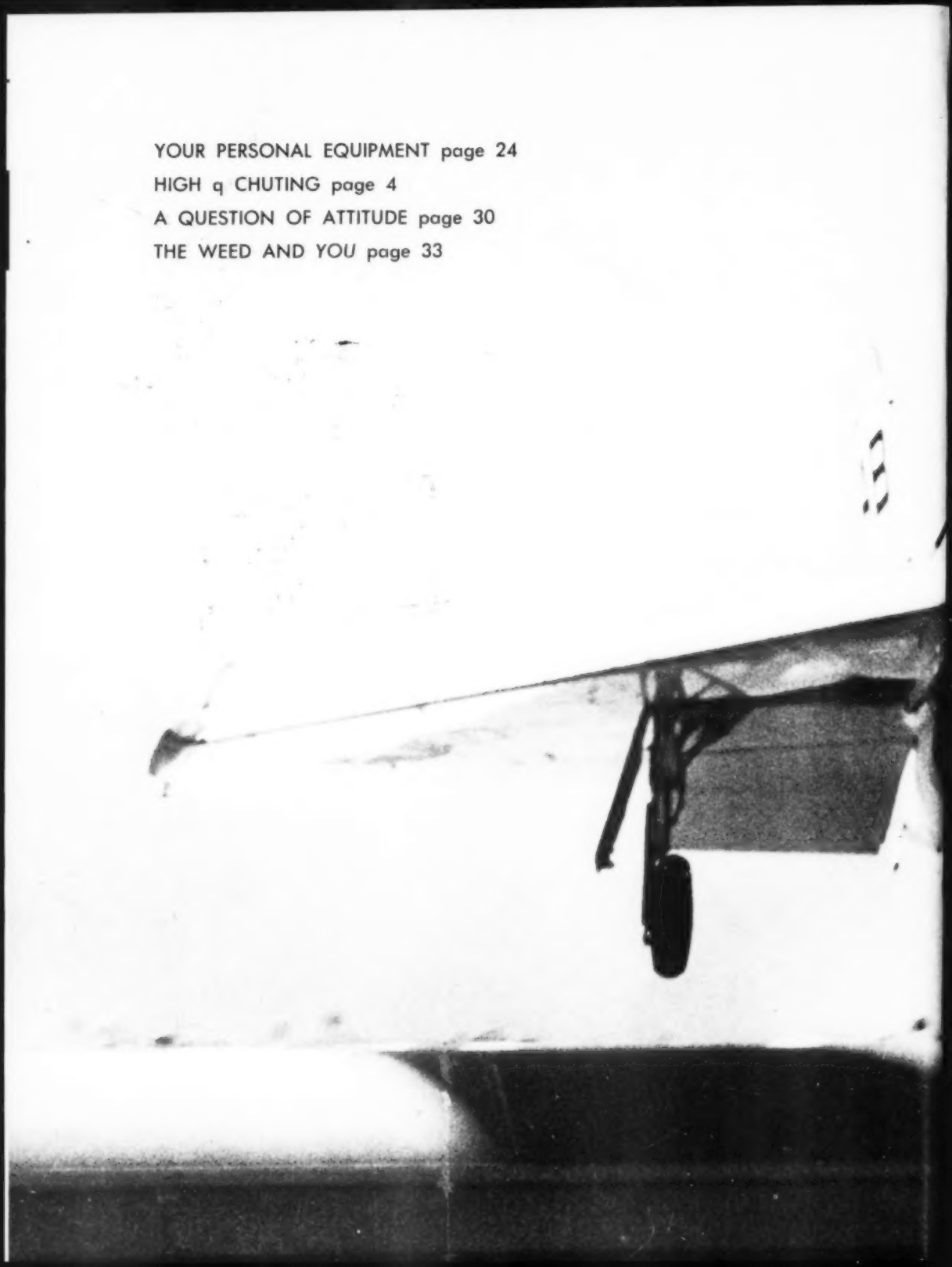
. . . . duty lifeboat crew of the USS *CURTIS* (AV-4) who rescued two helicopter pilots from the 29° F water of the Ross Sea.

When an HO4S piloted by LCDR Charles Constanza and LTJG John Erlewine crashed among ice floes just off the starboard bow of *CURTIS*, the duty lifeboat crew had them in the boat in less than five minutes and back aboard *CURTIS* in less than ten minutes. The crew consisted of F. D. BROTT, SN, Coxswain; R. W. FUNDERBURK, SN, bowhook; F. H. LESTER, FN, engineer; R. H. O'NEILL, SN, signalman; and E. D. CARLSON, hospitalman, first class.

In the commanding officer's letter of commendation addressed to each man, the crew was praised for "expeditious lowering of the boat, skillful handling of the boat in dangerous water covered with ice floes, expeditious recovery of the two pilots . . . expert application of first aid, and the safe recovery of the boat and delivery of the exhausted pilots . . . . ."

LCDR Constanza also warmly praised the crew, saying in part, ". . . our numbers would have been up in just a few more minutes . . . . how can anyone thank you enough for his life?"

Good, preplanned headwork is evident here, not only on the part of the boat crew but the entire ship. Although the lifeboat is not normally swung out during flight quarters, it had been swung out to the rail and warmed up on this occasion because someone realized the life or death importance of a few extra seconds in frigid water.

To the duty lifeboat crew who participated in the rescue of LCDR Constanza and LTJG Erlewine, a hearty *"WELL DONE!"*

YOUR PERSONAL EQUIPMENT page 24
HIGH q CHUTING page 4
A QUESTION OF ATTITUDE page 30
THE WEED AND *YOU* page 33